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Technical Service Manual

Part Number: 4114846-001
Rev: R
Date: 20 May 2002
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Narkomed 6000 Anesthesia System

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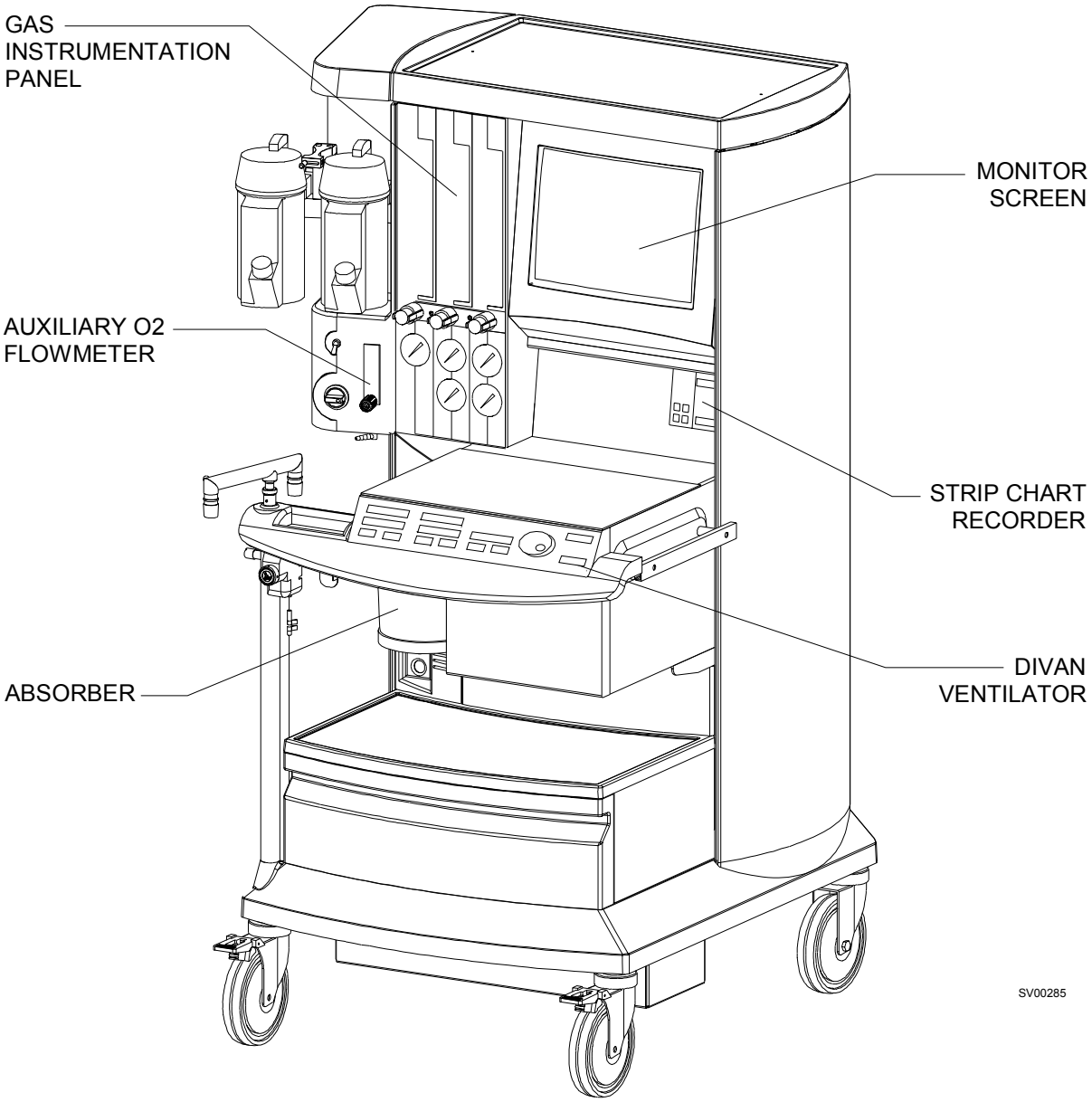
NARKOMED 6000 ANESTHESIA SYSTEM



1.0 RECOMMENDATIONS

Because of the sophisticated nature of Draeger Medical, Inc. anesthesia equipment and its critical importance in the operating room setting, it is highly recommended that only appropriately trained and experienced professionals be permitted to service and maintain this equipment. Please contact DrägerService® at (800) 543-5047 for service of this equipment.

Draeger Medical, Inc. also recommends that its anesthesia equipment be serviced at three-month intervals. Periodic Manufacturer's Service Agreements are available for equipment manufactured by Draeger Medical, Inc. For further information concerning these agreements, please contact us at (800) 543-5047.

Draeger Medical, Inc. products/material in need of factory repair shall be sent to:

DrägerService
3124 Commerce Drive
Telford, PA 18969 U.S.A.
(Include RMA Number)

HOW TO USE THIS MANUAL

The manual is divided into several sections. The DIAGNOSTICS section describes self-test and service diagnostics for checking the system functions. An understanding of the on-board service capabilities is necessary before any attempt is made to troubleshoot the unit. The TROUBLESHOOTING section lists error codes and provides troubleshooting guides to assist the Technical Service Representative in locating the source of a problem. The REPLACEMENT PROCEDURES section contains instructions for removal and replacement of assemblies that are considered field-replaceable. The ADJUSTMENT AND CALIBRATION PROCEDURES section contains the field procedures needed to restore original system specifications. The Periodic Manufacturer's Service (PMS) PROCEDURE section outlines the steps required to verify the electrical, mechanical and pneumatic safety of the unit and also identifies components requiring periodic replacement.

GENERAL TROUBLESHOOTING GUIDELINES

Troubleshooting the Narkomed 6000 should always begin by communicating with those who observed or experienced a problem with the unit. This may eliminate unnecessary troubleshooting steps. Once a general problem is identified, refer to the troubleshooting flow charts in Section 3 to determine the proper corrective action to be taken.

After any component is replaced, verify that the unit is operating properly by running the appropriate diagnostic procedure. The PMS PROCEDURE in Section 6 must also be performed after any component is replaced.

The general arrangement of the Narkomed 6000 anesthesia system is shown on the opposite page.

WARNINGS

Warnings are used in this manual before procedures which if not performed correctly could result in personal injury.

CAUTIONS

Cautions are used in this manual to alert service personnel to the possibility of damage to the equipment if a procedure is not performed correctly.

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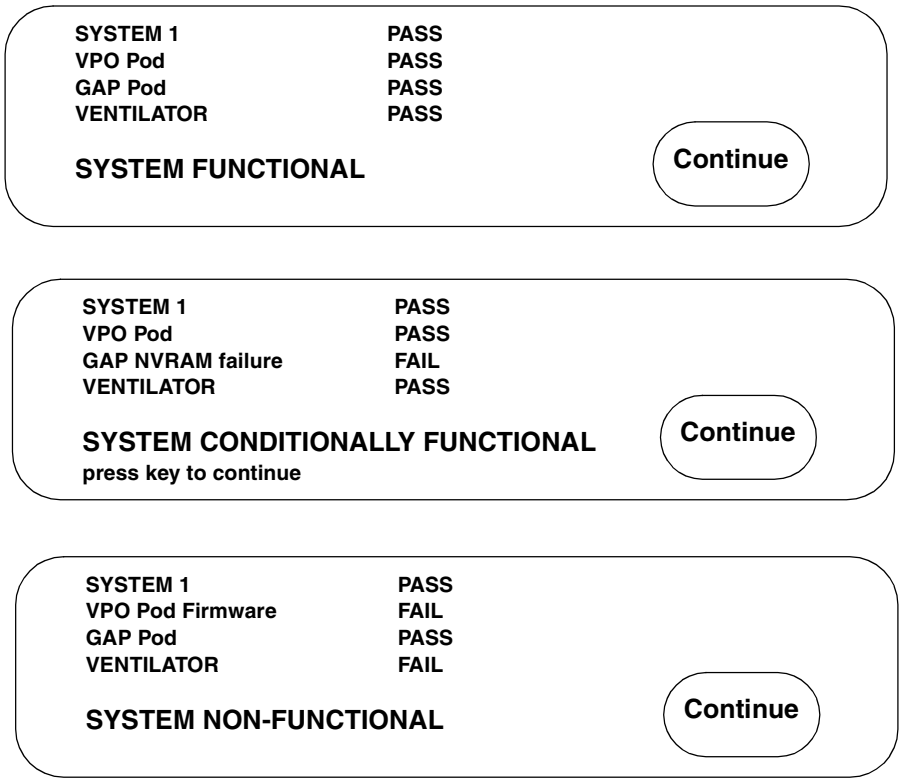
2.0 DIAGNOSTICS

The Narkomed 6000 contains a diagnostic system that monitors certain system functions and records their operational status. A series of tests is performed when the system is powered up and the results are displayed on the monitor screen. At the completion of the diagnostics, one of three screens will appear as shown in the following examples:



The screen labeled SYSTEM FUNCTIONAL indicates that all tests have passed. This screen will be displayed for approximately five seconds, and the system will then proceed to the monitor screen. (Touching the Continue key will bring up the monitor screen immediately.)

The screen labeled SYSTEM CONDITIONALLY FUNCTIONAL indicates that a problem has been detected but the system is still usable. This screen will remain displayed until the Continue key is touched.

The SYSTEM NON-FUNCTIONAL screen indicates that a serious problem has been detected. The system will not proceed any further.

Further diagnostic functions are available through service screens that can be accessed at the monitor. The following pages provide a description of the service screens. If no display is present upon system power-up, refer to Section 3 of this manual for troubleshooting assistance.

2.1 Accessing the Service Screens

To access the service screens you must first touch the Setup key at the bottom of the screen to display the setup notebook, then touch the About tab to display the About page of the setup notebook as shown in Figure 2-1.

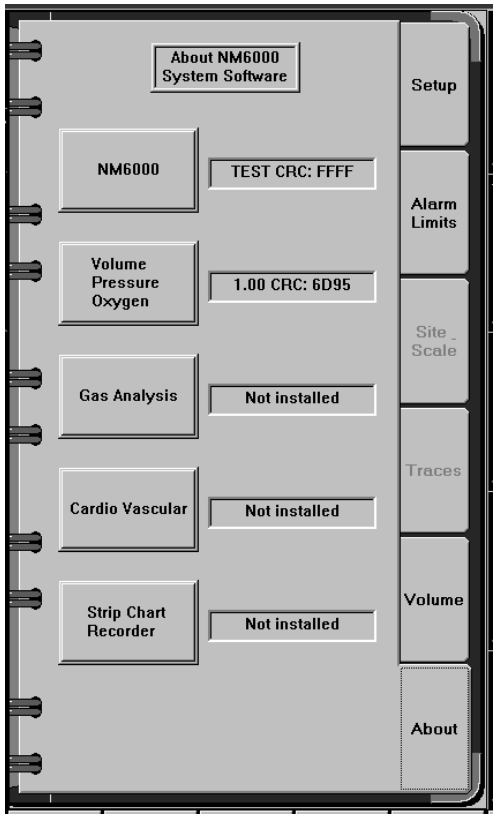


Figure 2-1. Setup Notebook About Page

On the About page, touch the following keys in this order:

1. Volume, Pressure, Oxygen
2. Gas Analysis
3. NM6000
4. Strip Chart Recorder

In the service mode, the following keys are added at the bottom of the screen:

Exit Service	Service Monitors	Service Config	Service Dump	Service Log

2.2 Advanced Service Mode

The Advanced service mode allows the service technician to change the NM6000 serial number via the NM6K Configuration Page (described later), to install or remove software options, update Pod based software and also allows the Pod Logs and Service Log (described later) to be cleared.

To enter the Advanced service mode, touch the following keys on the About page of the Setup Notebook in this order:

1. Strip Chart Recorder
2. NM6000
3. Gas Analysis
4. Volume, Pressure, Oxygen

2.3 Service Monitors Notebook

Touch the Service Monitors key at the bottom of the screen to display the Service Monitors Notebook.

Touching each tab of the service monitors notebook will bring up the corresponding service screen page, as described in the following paragraphs.

If desired, touch the Exit Service key to return to the monitoring screen.

2.3.1 Oxygen Monitor Service Screen

The Oxygen page of the service monitors notebook is shown on the left side of Figure 2-2. This page displays current and stored A/D values for the oxygen cells, date and time of the last O_2 zero calibration, and instructions for performing a zero calibration.

If the O2 zero calibration values stored in the VPO pod are invalid upon startup, a SERVICE O2 MON advisory is posted, the Service Monitors Oxygen page will show a blank Last O2 Calibration date, and the message ZERO CALIBRATION INVALID is displayed on the Service Monitors Oxygen page as shown on the right side of Figure 2-2. These three things also occur if a zero calibration is attempted with a current cell value of less than 230 or greater than 260.

Refer to Section 5 for details on both zero and 21% O_2 calibrations.

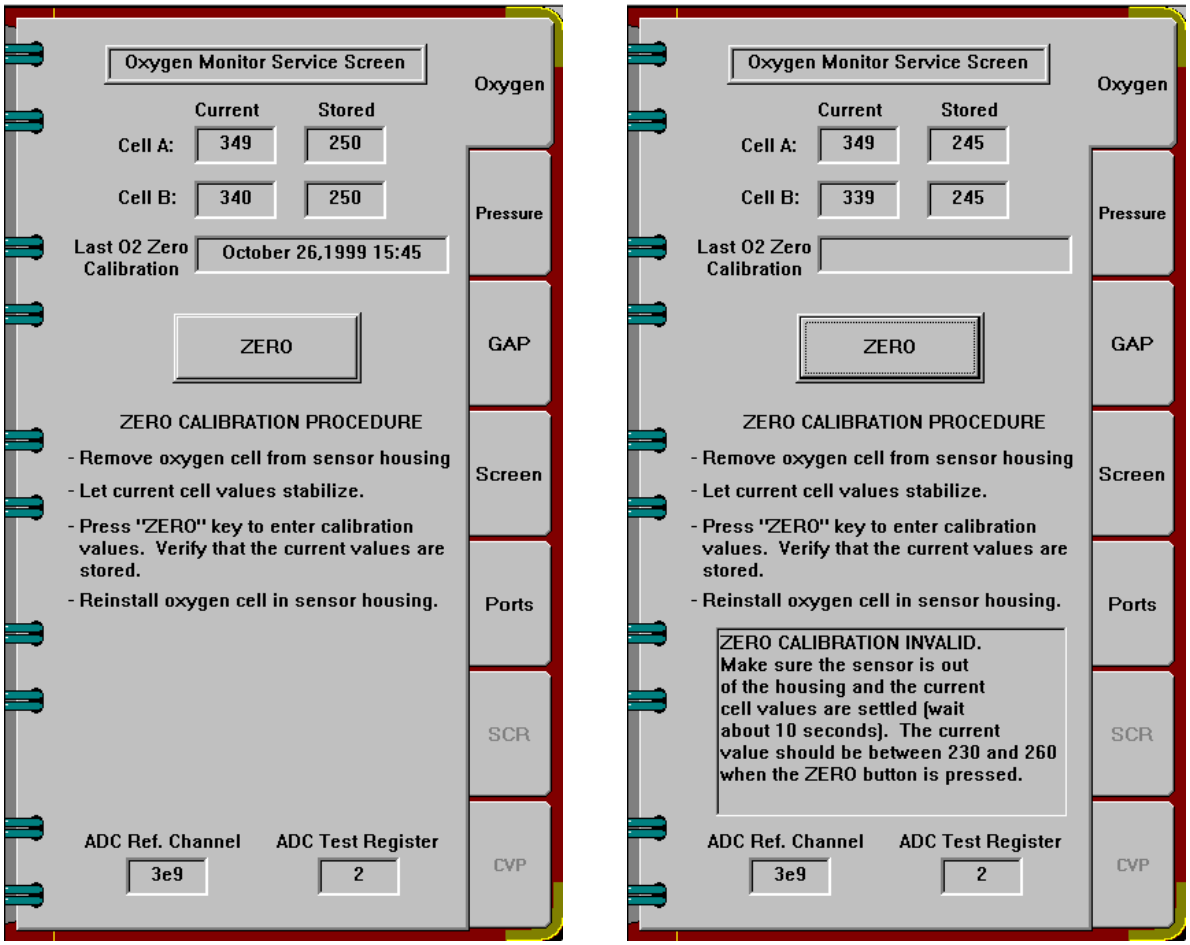


Figure 2-2. Service Monitors Notebook, Oxygen Page

2.3.2 Pressure Monitor Service Screen

Touch the Pressure tab of the Service Monitors Notebook to display the pressure monitor service screen shown in Figure 2-3.

This page displays current pressure value, stored zero and span values, and procedures for performing zero and span calibrations.

Test equipment connections are given in Section 5.

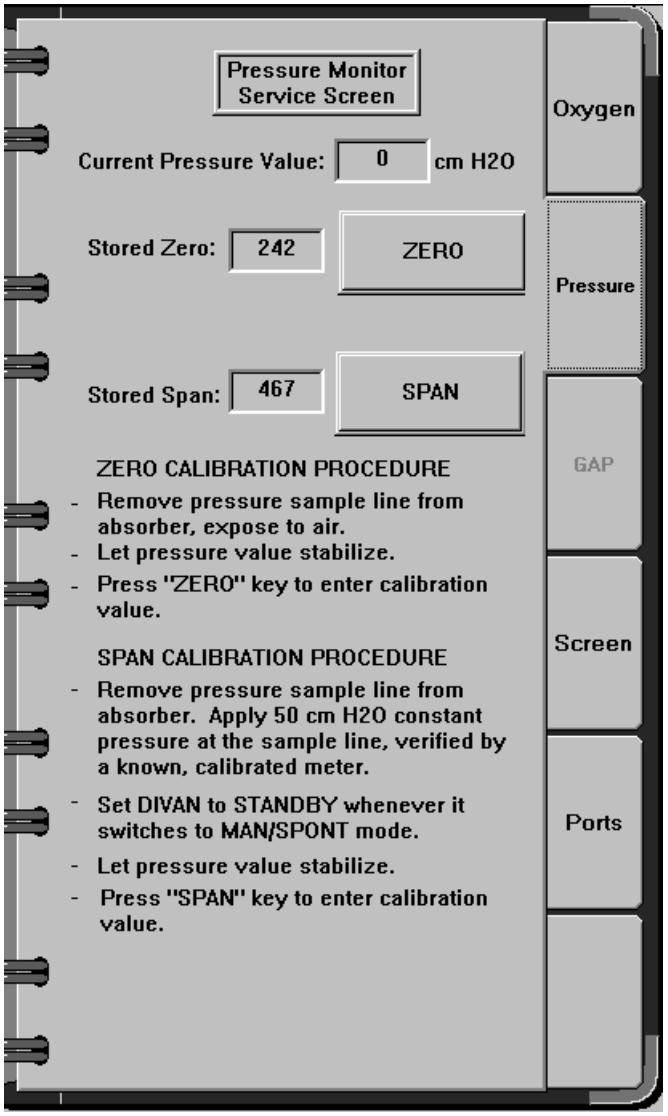

Pressure Monitor Service Screen
Current Pressure Value: 0 cm H2O
Stored Zero: 242
ZERO
Stored Span: 467
SPAN
ZERO CALIBRATION PROCEDURE
- Remove pressure sample line from absorber, expose to air.
- Let pressure value stabilize.
- Press "ZERO" key to enter calibration value.
SPAN CALIBRATION PROCEDURE
- Remove pressure sample line from absorber. Apply 50 cm H2O constant pressure at the sample line, verified by a known, calibrated meter.
- Set DIVAN to STANDBY whenever it switches to MAN/SPONT mode.
- Let pressure value stabilize.
- Press "SPAN" key to enter calibration value.
Oxygen
Pressure
GAP
Screen
Ports

Figure 2-3. Service Monitors Notebook, Pressure Page

2.3.3 Gas Analyzer Sample Flow Service Screen

Touch the GAP tab of the Service Monitors Notebook to display the flow monitor service screen shown in Figure 2-4.

This page provides touch keys and procedures for adjusting and storing the high (200 mL/min.) and low (100 mL/min.) sample line flow rates. Line block, accuracy mode, and calibration in progress indications are also provided on this page.

Location of the adjustable flow restrictor for initial flow rate setting, and test equipment connections are given in Section 5.

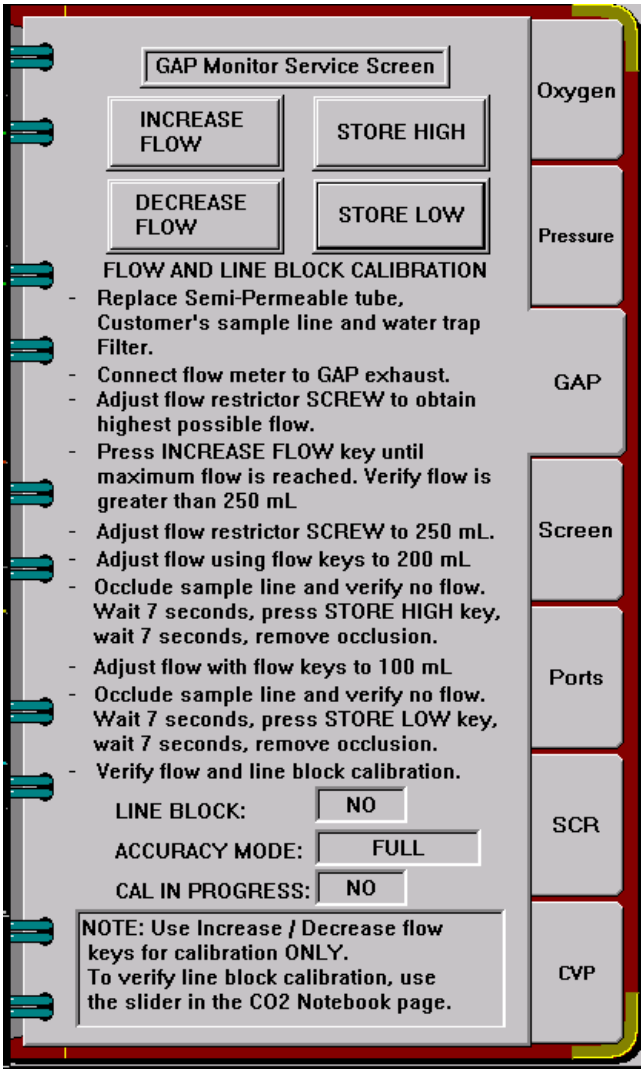

GAP Monitor Service Screen
INCREASE FLOW
STORE HIGH
DECREASE FLOW
STORE LOW
FLOW AND LINE BLOCK CALIBRATION
- Replace Semi-Permeable tube, Customer's sample line and water trap Filter.
- Connect flow meter to GAP exhaust.
- Adjust flow restrictor SCREW to obtain highest possible flow.
- Press INCREASE FLOW key until maximum flow is reached. Verify flow is greater than 250 mL
- Adjust flow restrictor SCREW to 250 mL.
- Adjust flow using flow keys to 200 mL
- Occlude sample line and verify no flow. Wait 7 seconds, press STORE HIGH key, wait 7 seconds, remove occlusion.
- Adjust flow with flow keys to 100 mL
- Occlude sample line and verify no flow. Wait 7 seconds, press STORE LOW key, wait 7 seconds, remove occlusion.
- Verify flow and line block calibration.
LINE BLOCK: NO
ACCURACY MODE: FULL
CAL IN PROGRESS: NO
NOTE: Use Increase / Decrease flow keys for calibration ONLY.
To verify line block calibration, use the slider in the CO2 Notebook page.
Oxygen
Pressure
GAP
Screen
Ports
SCR
CVP

Figure 2-4. Service Monitors Notebook, GAP Page

2.3.4 Screen Functions

Touch the Screen tab of the Service Monitors Notebook to display the service screen shown in Figure 2-5.

Touch screen calibration is needed whenever a monitor is replaced, or when picture size or centering is adjusted. This ensures correct registration of the touch screen coordinates with the picture.

NOTE: An advanced touch screen calibration procedure is needed when calibration is not possible under the usual procedure.

The Brightness/Contrast and Phase buttons are used to display test patterns for adjustments on machines with a flat panel display.

Refer to Section 5 for the complete procedures.

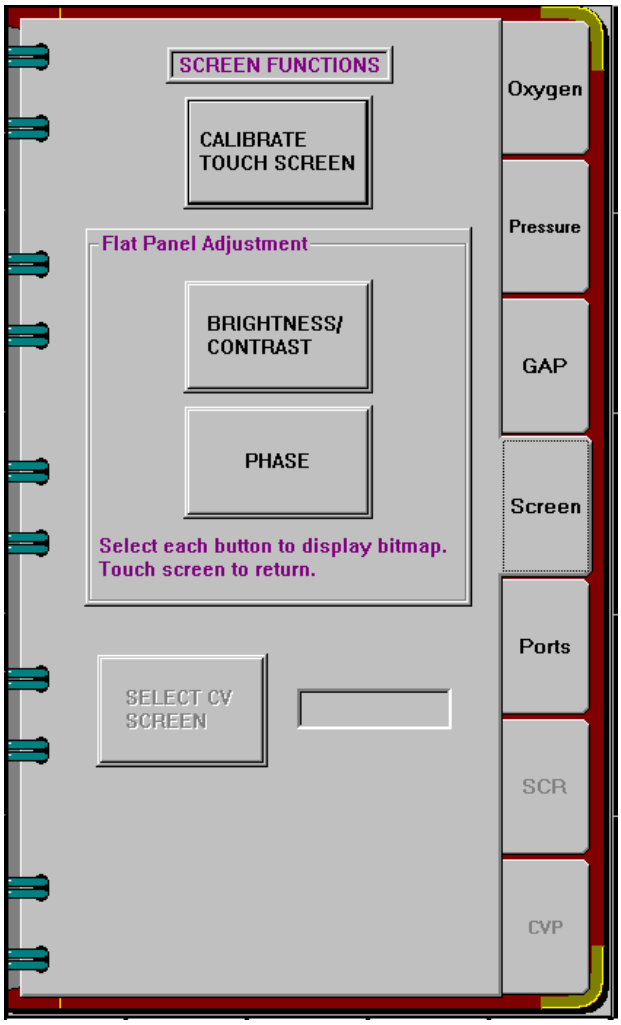


Figure 2-5. Service Monitors Notebook, Screen Page

2.3.5 Port Configuration

Touch the Ports tab of the Service Monitors Notebook to display the port configuration service screen shown in Figure 2-6. On machines with only one com port (com 2), the screen shown in Figure 2-6A applies.

This page allows com ports 5, 6, 7, and 8 on the machine to be configured for communication with external devices. Touching each parameter displayed allows you to cycle through the available settings for the corresponding port. The selections are:

Baud: 9600, 19200, 38400
Parity: EVEN, ODD, NONE
Stop Bits: 1, 2
Data Bits: 7, 8
Protocol: Vitalink

When the desired settings are displayed, touch the APPLY key to store the settings.

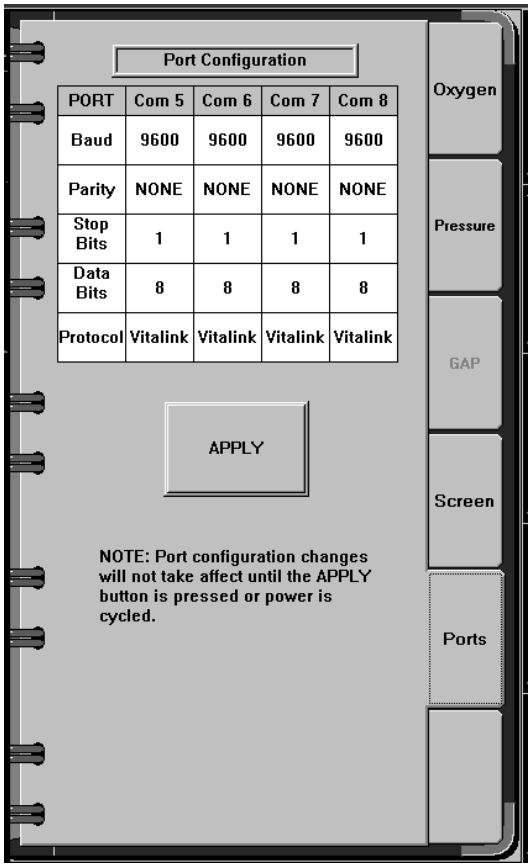

Port Configuration
PORT Com 5 Com 6 Com 7 Com 8
Baud 9600 9600 9600 9600
Parity NONE NONE NONE NONE
Stop Bits 1 1 1 1
Data Bits 8 8 8 8
Protocol Vitalink Vitalink Vitalink Vitalink
APPLY
NOTE: Port configuration changes will not take affect until the APPLY button is pressed or power is cycled.
Oxygen
Pressure
GAP
Screen
Ports

Figure 2-6. Service Monitors Notebook, Port Configuration Page

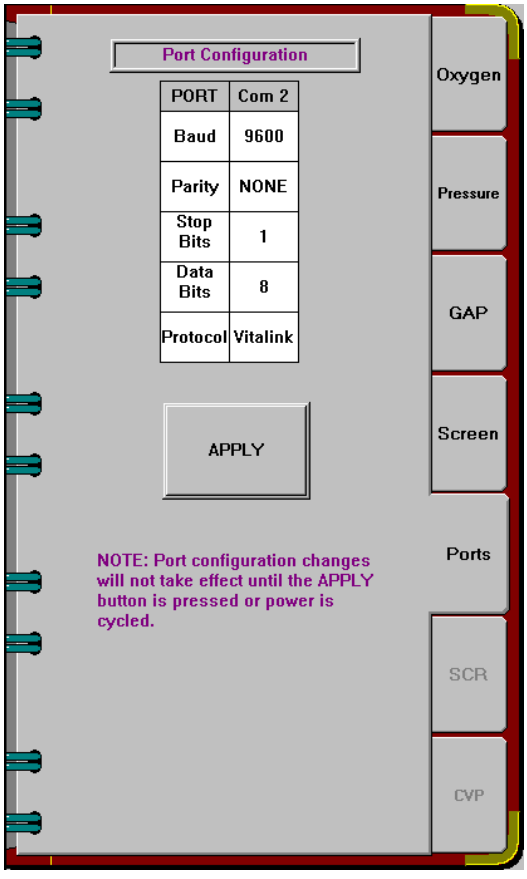


Figure 2-6A. Service Monitors Notebook, Port Configuration Page, One Com Port

2.3.6 SCR Print Test

Touch the SCR tab on the Service Monitors Notebook to display the Strip Chart Recorder Service Screen as shown in Figure 2-6B.

Diagnostic functions are provided for keys on the strip chart recorder. Touching the PRINT TEST button will produce the printer output shown in Figure 2-6C.

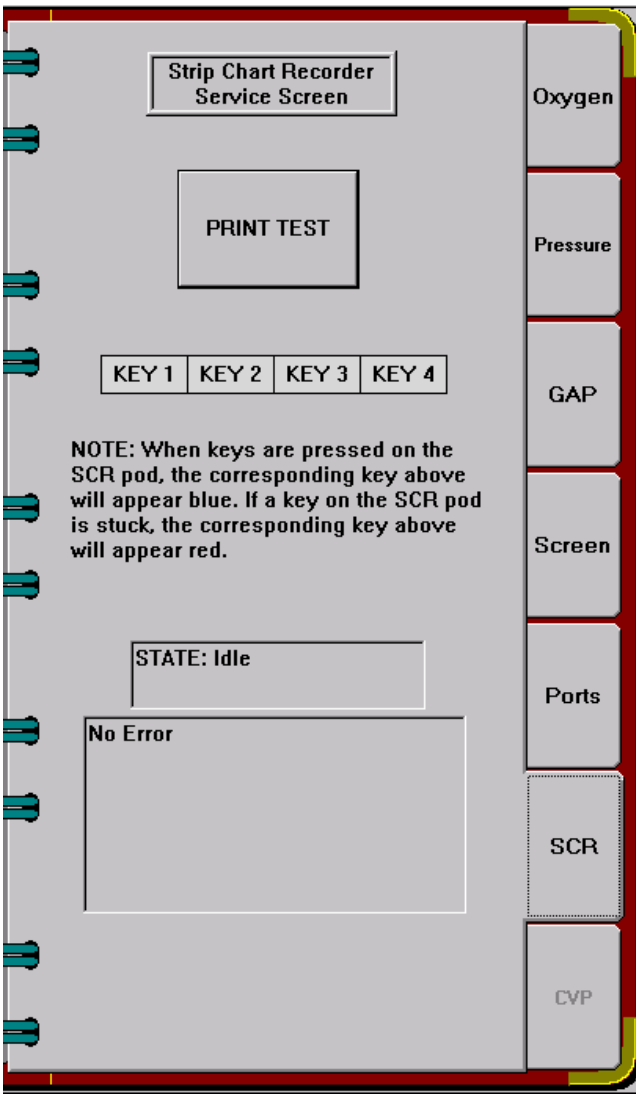


Figure 2-6B. Service Monitors Notebook, SCR Page

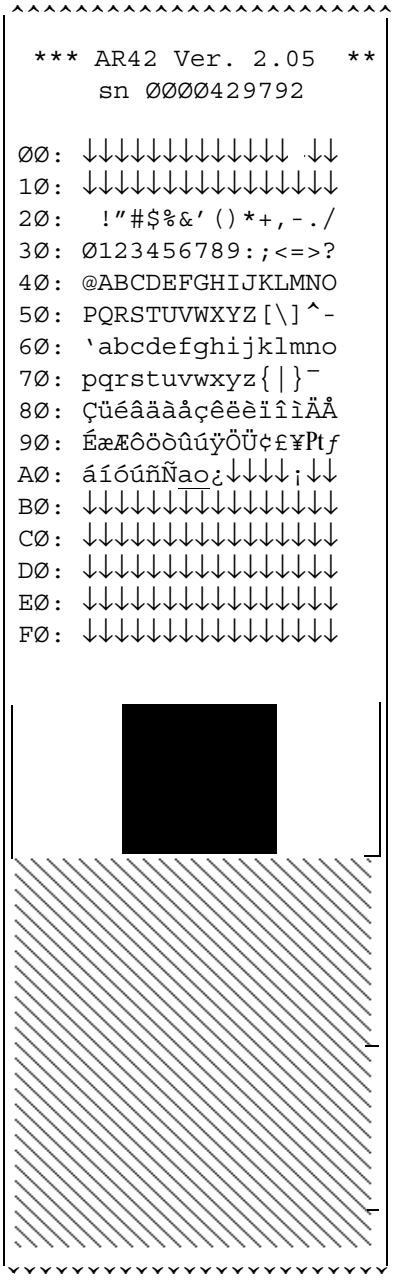


Figure 2-6C. Test Print

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2.4 Service Configuration Notebook

Touch the Service Config key at the bottom of the screen to display the Service Configuration Notebook shown in Figure 2-7. Tabs are displayed for each pod, and for the Narkomed 6000. Touching each tab of the service configuration notebook will bring up the corresponding configuration page, as described in the following paragraphs. (An Options page is enabled when you are in the Restricted Service Mode. See Paragraph 2.2A.)

2.4.1 Pod Configuration Pages

The VPO, GAP, SCR and CV pages display the following information for each pod:

Last Service Date
Hours Running Since Last Service
Total Machine Run Hours
Serial Number
IP Address
Ethernet Address
Identification for Boot Prom, Pod Base Software and Application

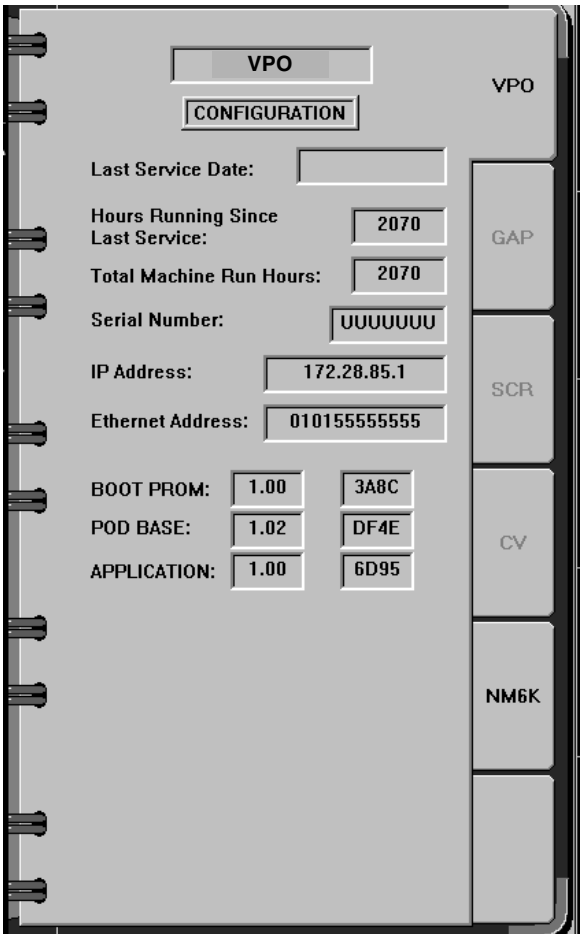


Figure 2-7. Service Configuration Notebook, VPO Page

2.4.2 UPDATE Page

Touching the UPDATE tab of the Service Configuration Notebook will display the page shown in Figure 2-8.

This page allows the service technician to download images to the pods. If the information on the update page does not match the image on the host, this information on the update page appears in red when in the Advanced service mode. When in Advanced mode, pressing the appropriate box initiates a download, and the information in the boxes reflects the state of the download. NOTE: When the key is pressed, the notebook disappears. Press the Service Config key to refresh the Service Config Notebook. If not in Advanced mode, pressing the boxes will display the message: “Enter Advanced Access Mode in order to download.”

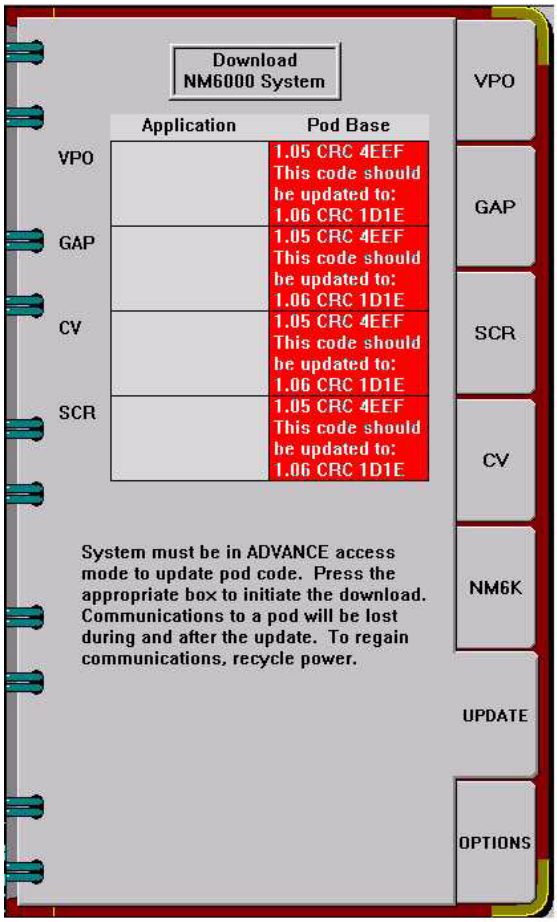

Download NM6000 System
Application
Pod Base
VPO
GAP
CV
SCR
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
System must be in ADVANCE access mode to update pod code. Press the appropriate box to initiate the download. Communications to a pod will be lost during and after the update. To regain communications, recycle power.
VPO
GAP
SCR
CV
NM6K
UPDATE
OPTIONS

Figure 2-8. System Update Download Screen

2.4.3 NM6K Configuration Page

Touching the NM6K tab of the Service Configuration Notebook will display the NM6000 configuration page shown in Figure 2-9. This page displays the Last Service Date, Hours Running Since Last Service, and Total Machine Run Hours. Touching the RESET LAST SERVICE DATE key will reset the displayed last service date to the current date for the machine and for all connected pods.

This page also displays the next PMS Due Date. Touch the ▲ or ▼ keys to set the desired date.

A Service Parts listing (described later) is also accessed through this screen.

Should the machine's processor be replaced, the machine serial number needs to be entered. You can only do this while in the Advanced service mode: Press the Serial Number button, and type the new number with the touch keys that appear on the page. Press the Serial Number button again to enter the number. This event will be recorded in the Service Log.

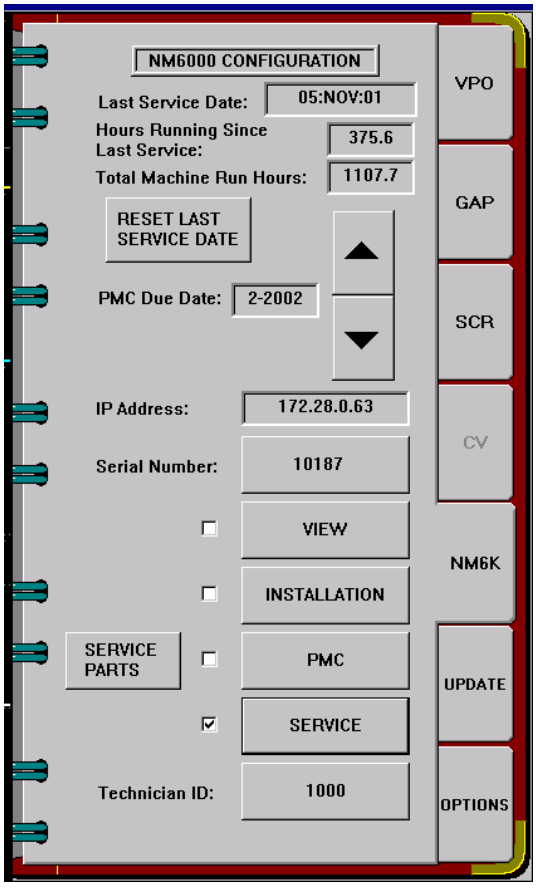


Figure 2-9. Service Configuration Notebook, NM6K Page

2.4.4 Service Parts Screens

Press the SERVICE PARTS button on the NM6K Configuration Page to view the service parts list as shown in Figure 2-10. If you are in the PMS mode (press the Preventive Maintenance button and enter a valid technician ID), you will be able to modify the list. If you are not in the PMS mode and attempt to modify the list, you will be prompted to "Enter Preventive Maintenance in order to change part information."

In the user access mode Several keys appear on the Service Parts screen; their function are as follows:

PREVIOUS:	Move to the entry above the current selection.
NEXT:	Move to the entry below the current selection
REPLACE:	Brings up a dialog box asking if the selected part was replaced.
SERIAL NUMBER:	Brings up a keyboard for the user to enter a serial number
OK:	Saves all information, and returns display to the NM6K configuration page. Any changes made are recorded in the service log.
CANCEL:	Any changes made to the list are not saved, and display returns to the NM6K configuration page.

In the Advanced access mode, the following additional keys are displayed:

FACTORY DEFAULTS:	Changes the list to factory defaults for part numbers, descriptions, quantity and schedule.
SET DATES:	Brings up dialog box that allows user to set dates for the selected part, or to clear all dates.
PART NUMBER:	Brings up a keyboard that allows user to change a part number.

When the Service Parts screen is entered for the first time, all dates and serial numbers are blank except for pod serial numbers. You can select a part by using the Previous or Next keys, or by pressing the desired row on the screen under one of the date columns.

When you press the Replace key, the screen appears as shown in Figure 2-11.

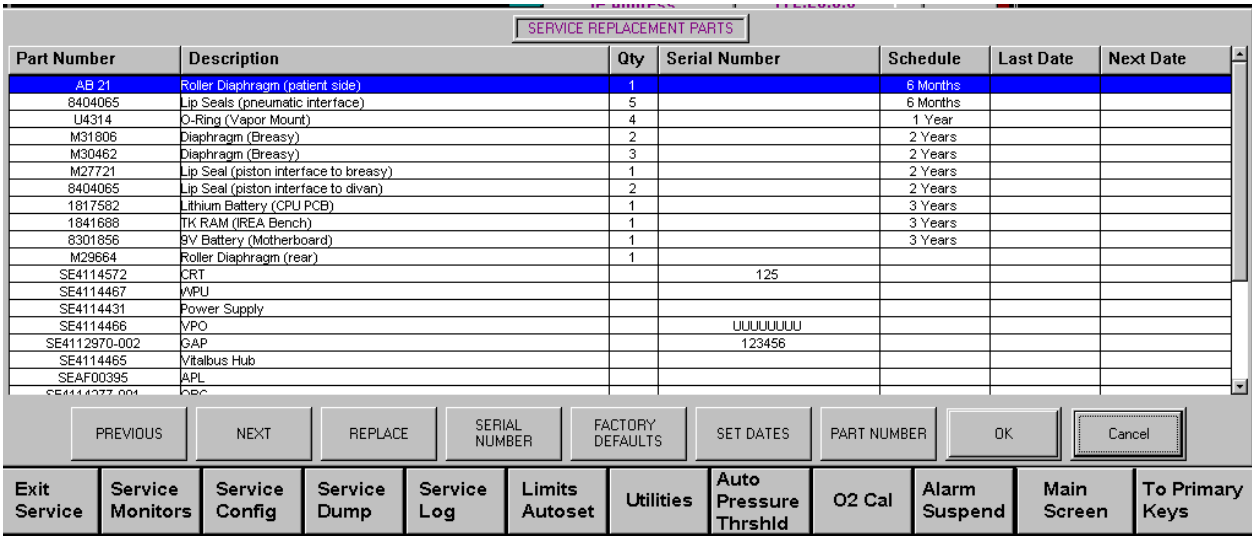


Figure 2-10. Service Parts Screen

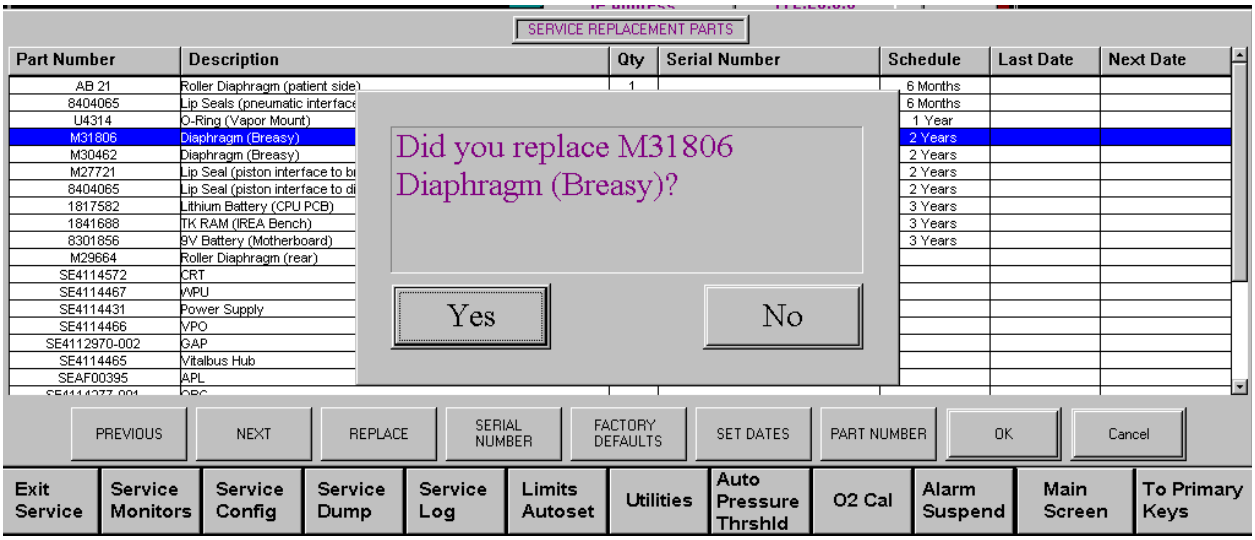


Figure 2-11. Service Parts Replacement Query

If you press the No button, the dates are not modified.

If you press the Yes button the current date will be entered under Last Date for the item selected, and the Next Date will be calculated using the schedule. If there is no replacement schedule, the Next Date will remain blank.

If you press any row under the Schedule column, a dialog box will appear asking if you replaced all parts with the same schedule. If you answer No, the dates are not modified. If you answer Yes, all dates for parts with the same schedule can be updated. All blank Next Dates will be modified assuming that this is the first replacement. If the current date is in the same month or later than the Next Date, that row will appear in red.

If you press any row in red under the Description or Quantity column, a dialog box will appear asking if you replaced all parts that are due. If you answer Yes, the Last Date and Next Date will be updated for all parts that are due to be replaced.

Pressing the Set Dates key will bring up the screen shown in Figure 2-12.

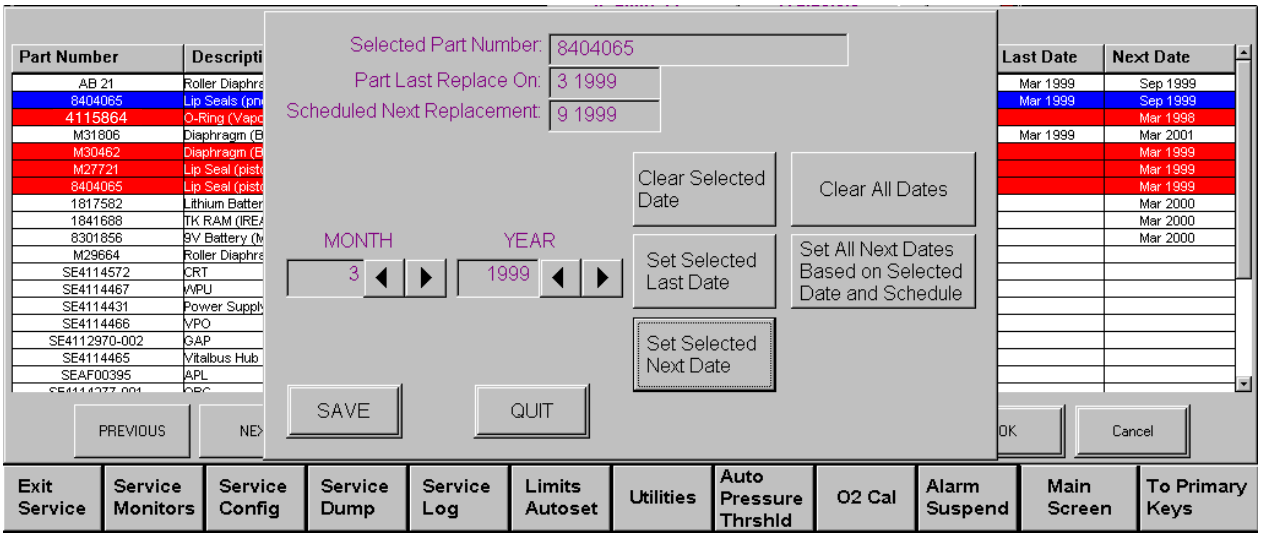


Figure 2-12. Service Parts Set Dates Screen

If you press the Clear Selected Date key, the Last Date and Next Date for the selected part will be cleared.

If you press the Clear All Dates key, all information in the Last Date and Next Date columns will be cleared.

If you press the Set Selected Last Date key, The Last Date for the selected part will be changed to the month and year shown on this window.

If you press the Set All Next Dates Based on Selected Date and Schedule key, all the information in the Next Date column will be calculated based on the selected month and year. The selected month and year can be changed using the arrow keys.

If you press the Set Selected Next Date key, the Next Date for the selected part will be changed to the month and year selected.

Pressing the SAVE key will update the parts list display. If you press the QUIT key, none of the changes made using this window will be saved.

2.4.5 NM6000 Software Options Screen

Touching the Options tab in the Service Configuration Notebook will display the page shown in Figure 2-8A.

This page allows the service technician to enable or disable software controlled options when in advanced service menu. This page can not be selected in User Access Service Mode.

NOTE: 'Air Only Mode' and Templates & Sounds options also require keyloks to enable these features. If application software is version 2.06, Low Flow Wizard also requires a Keylok to enable this feature.

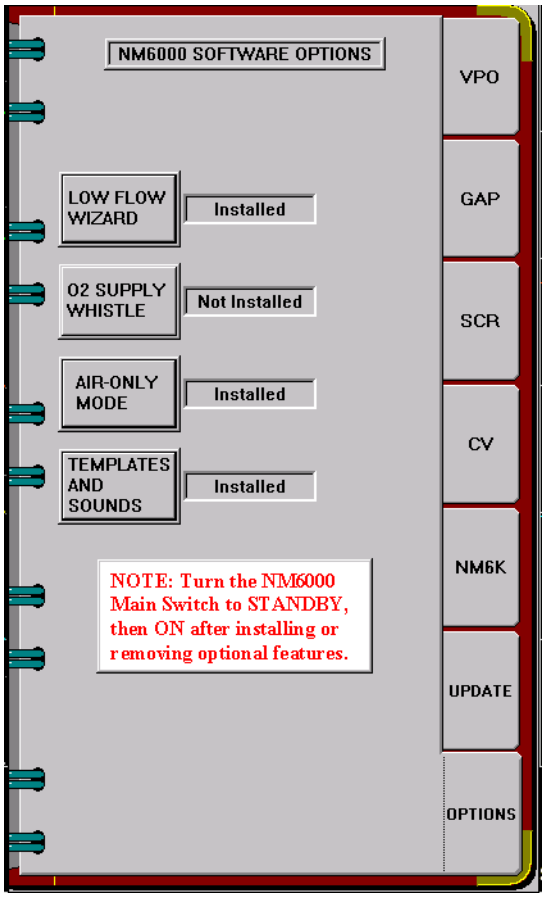


Figure 2-12 A. Software Options Screen

This page intentionally left blank

2.5 Service Dump Notebook

Touch the Service Dump key at the bottom of the screen to display the Service Dump Notebook shown in Figure 2-13. Tabs are displayed for each pod, and for the Narkomed 6000. Touching each tab of the service dump notebook will display dump data for the corresponding page.

Touch the PRINT DUMP key to print out the data on the strip chart recorder. If there is no strip chart recorder on the machine, then touching the PRINT DUMP key will write the data to a file on the hard drive of the NM6000.

To clear the service dump, enter the advanced service menu, then touch the CLEAR DUMP key to clear the service dump data for that page.

Touching the POD LOG button causes the pod log screen to be displayed in the same area as the service log. See next page.

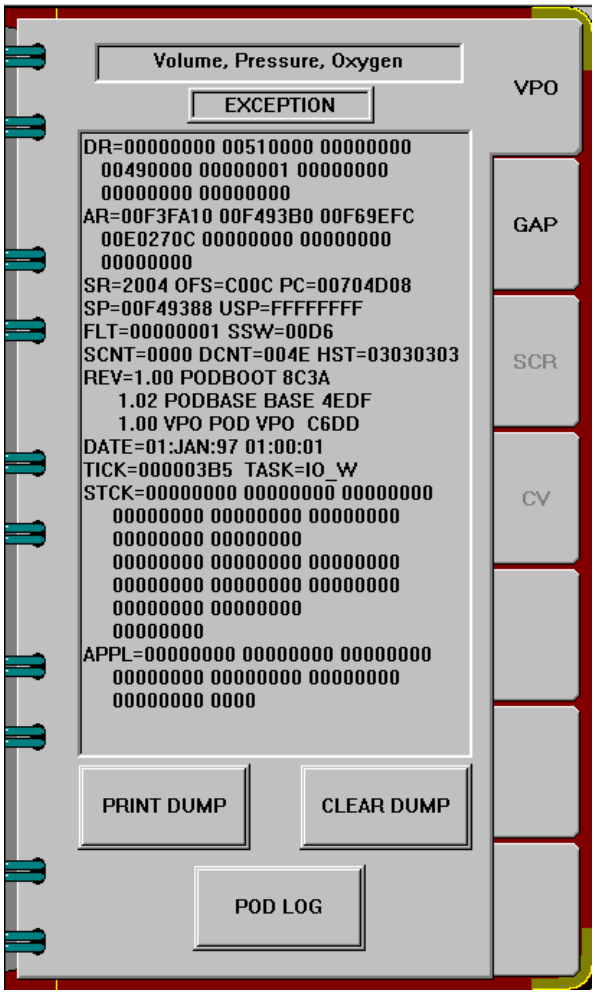


Figure 2-13. Service Dump Notebook

2.5.1 Pod Log Screens

While the NM6000 is obtaining the service log, a progress bar is displayed and an ABORT REFRESH button is enabled. Pressing this button will cause the NM6000 to stop acquiring the service log from the pod.

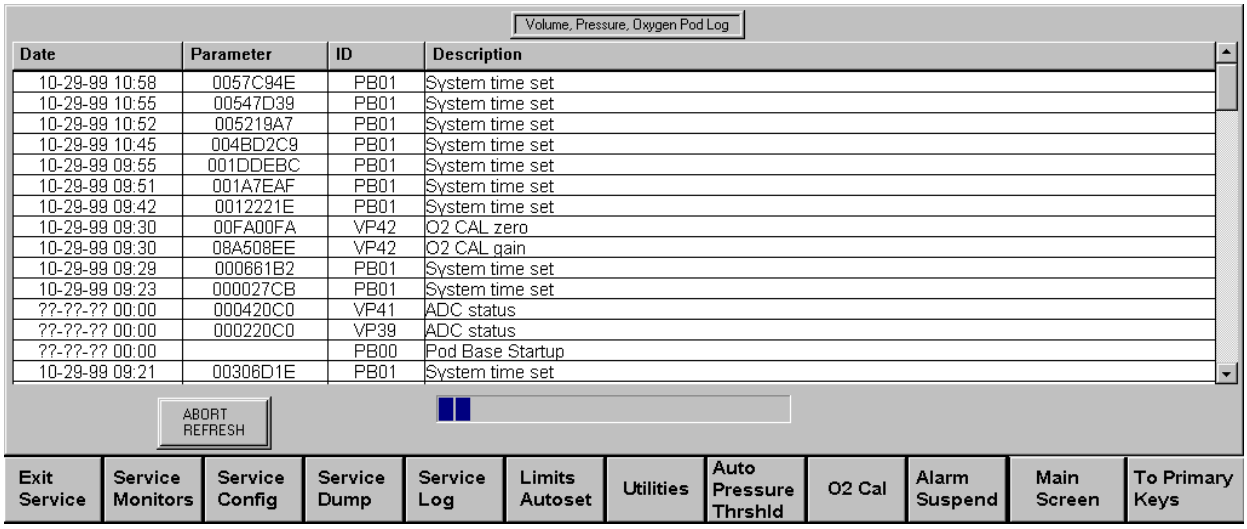

Volume, Pressure, Oxygen Pod Log
Date
Parameter
ID
Description
10-29-99 10:58 0057C94E PB01 System time set
10-29-99 10:55 00547D39 PB01 System time set
10-29-99 10:52 005219A7 PB01 System time set
10-29-99 10:45 004BD2C9 PB01 System time set
10-29-99 09:55 001DDEBC PB01 System time set
10-29-99 09:51 001A7EAF PB01 System time set
10-29-99 09:42 0012221E PB01 System time set
10-29-99 09:30 00FA00FA VP42 O2 CAL zero
10-29-99 09:30 08A508EE VP42 O2 CAL gain
10-29-99 09:29 000661B2 PB01 System time set
10-29-99 09:23 000027CB PB01 System time set
??-??-?? 00:00 000420C0 VP41 ADC status
??-??-?? 00:00 000220C0 VP39 ADC status
??-??-?? 00:00 PB00 Pod Base Startup
10-29-99 09:21 00306D1E PB01 System time set
ABORT REFRESH
Exit Service
Service Monitors
Service Config
Service Dump
Service Log
Limits Autoset
Utilities
Auto Pressure Thrshld
O2 Cal
Alarm Suspend
Main Screen
To Primary Keys

Figure 2-13A. Pod log download screen

When all entries are obtained (or refresh is aborted), the ABORT REFRESH button becomes the REFRESH BUTTON, and the SAVE, PRINT, CLEAR and OK buttons appear.

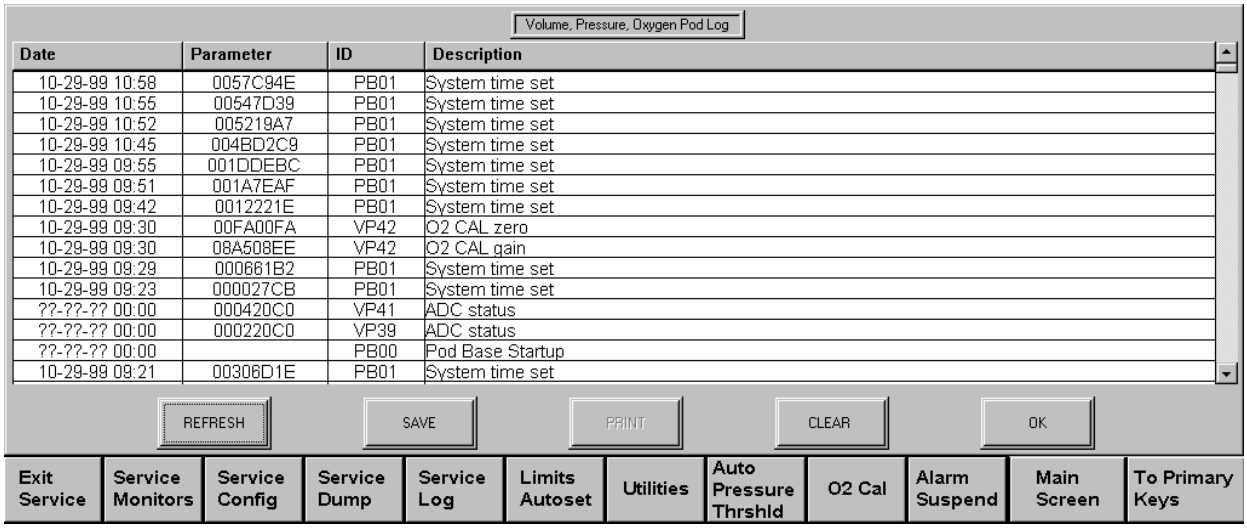


Figure 2-13B. Pod log screen

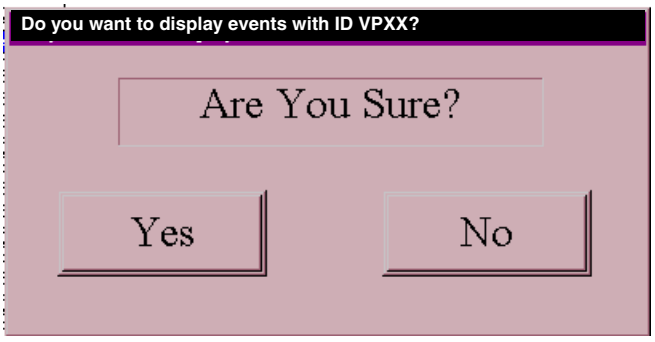
Pressing the REFRESH button will cause the NM6000 to obtain the log from the pod again. When the SAVE button is pressed, the pod service log is saved to a file according to pod type:

GAP: c:\nad\datfiles\podlog_gap.txt VPO: c:\nad\datfiles\podlog_vpo.txt

The pod service log is saved as an ASCII file with a header followed by service log entries each on a separate line. The header contains the type of pod, date and time log was saved, pod serial number, version and CRC for the BOOT PROM, PBS and application, NM6000 serial number, version and CRC. Each log entry contains the date and time, parameter value, and text:

```
SERVICE POD LOG FOR THE VPO POD

DATE: 9-22-1999 TIME: 10:48:23

POD SERIAL NUMBER: NNNNNNNN

BOOT PROM VERSION:       1.01    CRC:  7295
POD BASE VERSION:        1.02    CRC:  4EDF
APPLICATION VERSION:     DEV1    CRC:  8D00
NM6000 SERIAL NUMBER:  145
NM6000 VERSION:          0.0     CRC:  FFFF

-------------------------------------------------

09-22-99  10:36  007C8D4C  PB01  System time set
09-22-99  10:14  00F00104  VP42  O2 CAL zero
09-22-99  10:14  08BD09E9  VP42  O2 CAL gain
09-22-99  10:07  00000000  VP44  Sensor Disconnect
```

The CLEAR button is enabled when you are in the Advanced Access mode. Pressing this button clears the pod log. Pressing the OK button removes the pod service log screen. While the pod service log is displayed, the soft keys and numeric boxes are disabled. If an entry under the ID column is pressed, the following dialog box is displayed:



The VPxx in the title corresponds to the ID of the entry that was pressed. If YES is pressed, the displayed service log contains only entries with the selected ID. If an entry is pressed under any column other than ID, that entry is displayed in blue. The entry is then marked with * in the saved text.

2.6 Service Log

Press the Service Log key at the bottom of the screen to display the service log. Initially, a blank page appears as shown in Figure 2-14.

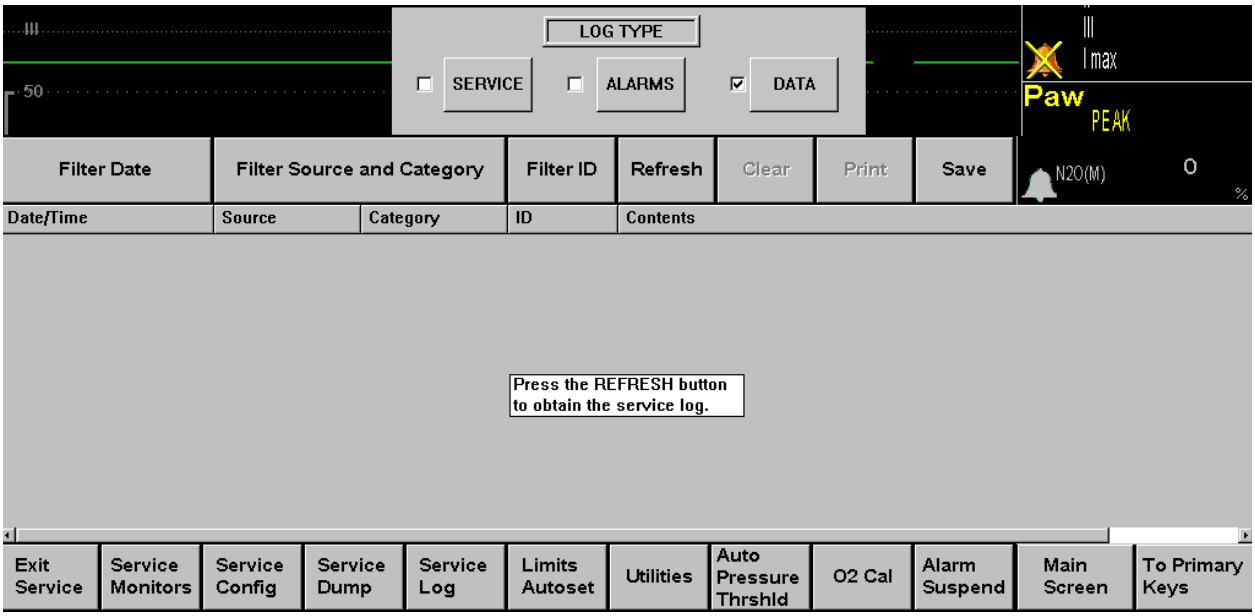


Figure 2-14. Service Log Initial Screen

Press the Refresh button to bring up the service log as shown in Figure 2-15.

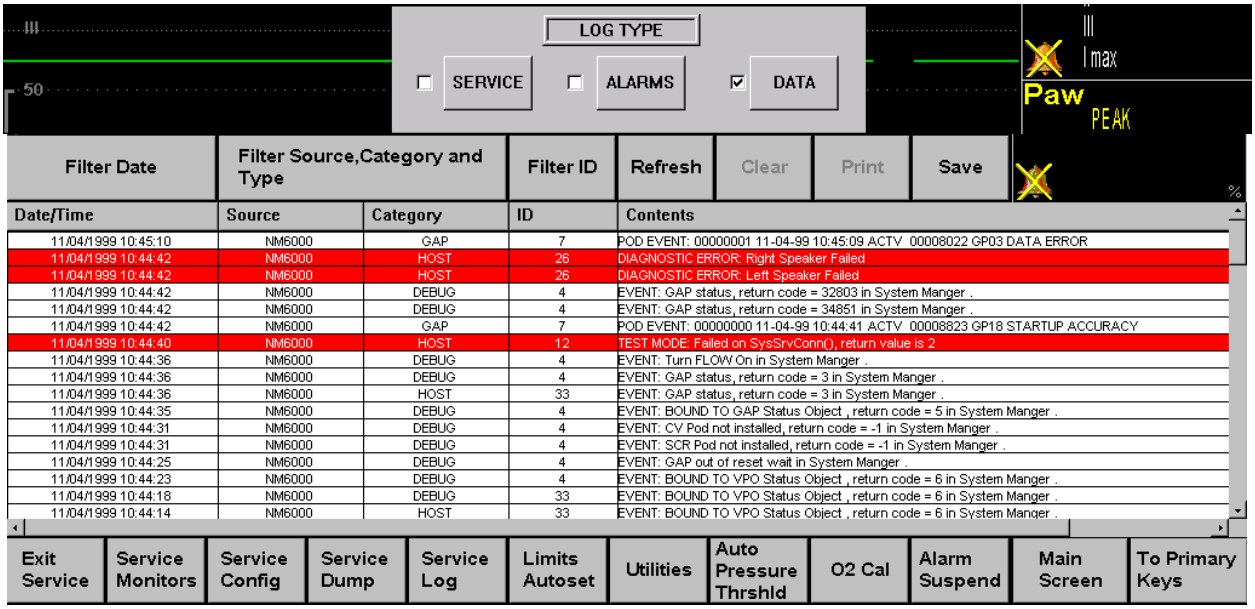

LOG TYPE
SERVICE
ALARMS
DATA
50
Imax
Paw
PEAK
%
Filter Date
Filter Source,Category and Type
Filter ID
Refresh
Clear
Print
Save
Date/Time
Source
Category
ID
Contents
11/04/1999 10:45:10 NM6000 GAP 7 POD EVENT: 00000001 11-04-99 10:45:09 ACTV 00008022 GP03 DATA ERROR
11/04/1999 10:44:42 NM6000 HOST 26 DIAGNOSTIC ERROR: Right Speaker Failed
11/04/1999 10:44:42 NM6000 HOST 26 DIAGNOSTIC ERROR: Left Speaker Failed
11/04/1999 10:44:42 NM6000 DEBUG 4 EVENT: GAP status, return code = 32803 in System Manger .
11/04/1999 10:44:42 NM6000 DEBUG 4 EVENT: GAP status, return code = 34851 in System Manger .
11/04/1999 10:44:42 NM6000 GAP 7 POD EVENT: 00000000 11-04-99 10:44:41 ACTV 00008823 GP18 STARTUP ACCURACY
11/04/1999 10:44:40 NM6000 HOST 12 TEST MODE: Failed on SysSrvConn(), return value is 2
11/04/1999 10:44:36 NM6000 DEBUG 4 EVENT: Turn FLOW On in System Manger .
11/04/1999 10:44:36 NM6000 DEBUG 4 EVENT: GAP status, return code = 3 in System Manger .
11/04/1999 10:44:36 NM6000 HOST 33 EVENT: GAP status, return code = 3 in System Manger .
11/04/1999 10:44:35 NM6000 DEBUG 4 EVENT: BOUND TO GAP Status Object , return code = 5 in System Manger .
11/04/1999 10:44:31 NM6000 DEBUG 4 EVENT: CV Pod not installed, return code = -1 in System Manger .
11/04/1999 10:44:31 NM6000 DEBUG 4 EVENT: SCR Pod not installed, return code = -1 in System Manger .
11/04/1999 10:44:25 NM6000 DEBUG 4 EVENT: GAP out of reset wait in System Manger .
11/04/1999 10:44:23 NM6000 DEBUG 4 EVENT: BOUND TO VPO Status Object , return code = 6 in System Manger .
11/04/1999 10:44:18 NM6000 DEBUG 33 EVENT: BOUND TO VPO Status Object , return code = 6 in System Manger .
11/04/1999 10:44:14 NM6000 HOST 33 EVENT: BOUND TO VPO Status Object , return code = 6 in System Manger .
Exit Service
Service Monitors
Service Config
Service Dump
Service Log
Limits Autoset
Utilities
Auto Pressure Thrshld
O2 Cal
Alarm Suspend
Main Screen
To Primary Keys

Figure 2-15. Service Log

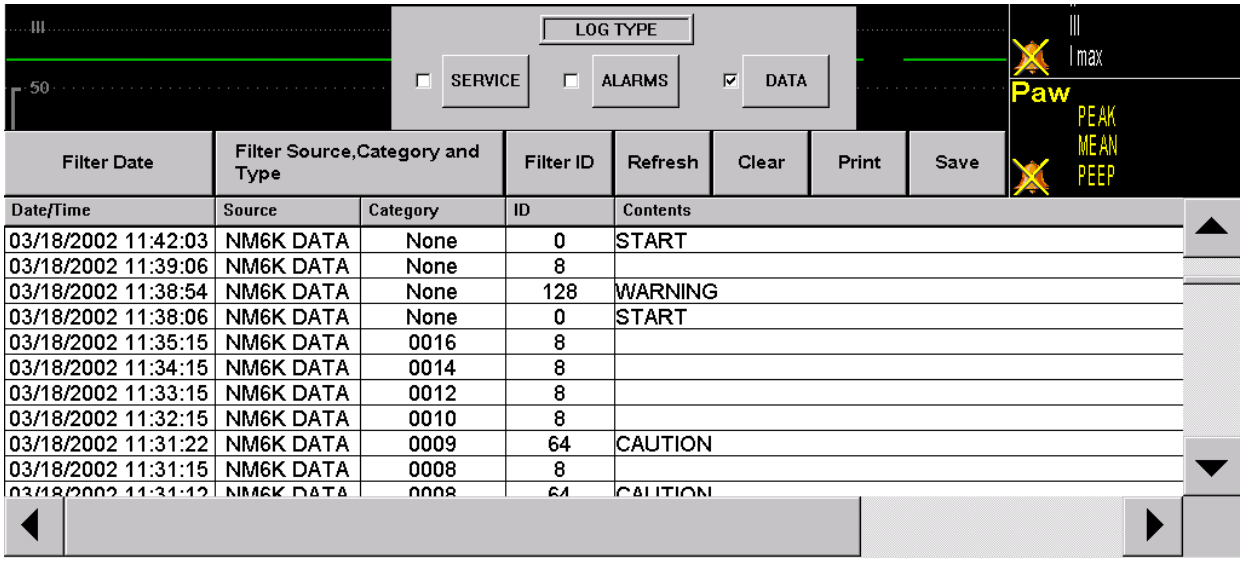


Figure 2-15A. Data Log Screen

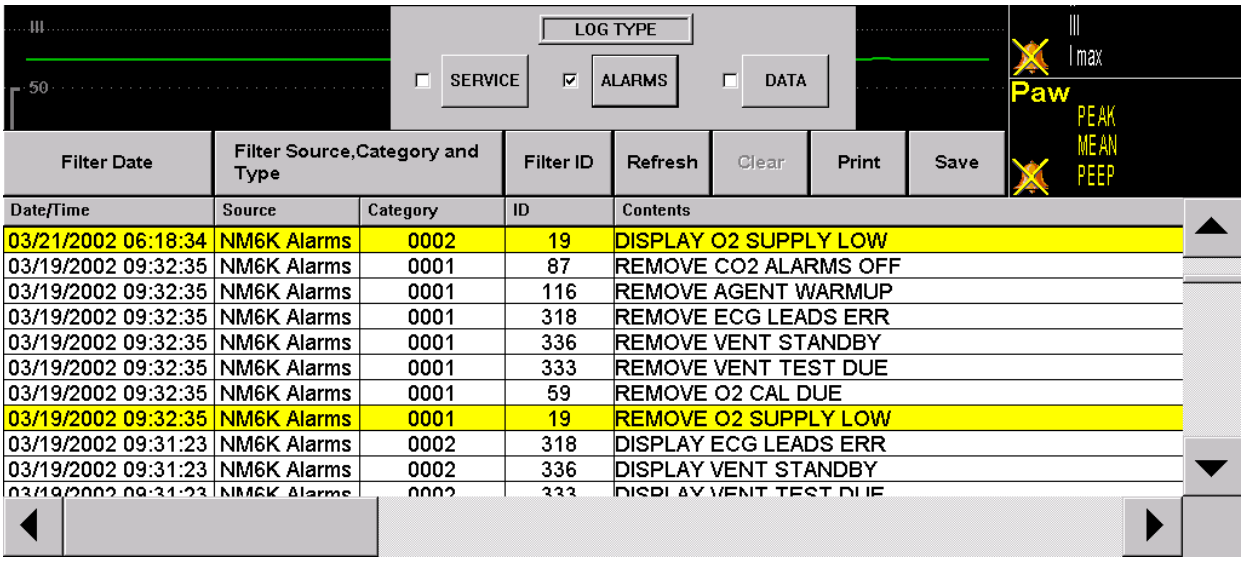

LOG TYPE
SERVICE
ALARMS
DATA
Filter Date
Filter Source,Category and Type
Filter ID
Refresh
Clear
Print
Save
Date/Time
Source
Category
ID
Contents
03/21/2002 06:18:34 NM6K Alarms 0002 19 DISPLAY O2 SUPPLY LOW
03/19/2002 09:32:35 NM6K Alarms 0001 87 REMOVE CO2 ALARMS OFF
03/19/2002 09:32:35 NM6K Alarms 0001 116 REMOVE AGENT WARMUP
03/19/2002 09:32:35 NM6K Alarms 0001 318 REMOVE ECG LEADS ERR
03/19/2002 09:32:35 NM6K Alarms 0001 336 REMOVE VENT STANDBY
03/19/2002 09:32:35 NM6K Alarms 0001 333 REMOVE VENT TEST DUE
03/19/2002 09:32:35 NM6K Alarms 0001 59 REMOVE O2 CAL DUE
03/19/2002 09:32:35 NM6K Alarms 0001 19 REMOVE O2 SUPPLY LOW
03/19/2002 09:31:23 NM6K Alarms 0002 318 DISPLAY ECG LEADS ERR
03/19/2002 09:31:23 NM6K Alarms 0002 336 DISPLAY VENT STANDBY
Imax
Paw
PEAK
MEAN
PEEP

Figure 2-15B. Alarm Log Screen

Error events are displayed in red, warning events appear in yellow, and information events are in white. Pressing the Save button will save the service log to the hard drive for later retrieval.

Several Filter keys are displayed with the service log. When the Filter Date key is pressed, a filter date window appears which allows you to select only the events by date that you want to display. Press the OK button to display those events.

Pressing the Filter Source and Category button brings up a window that allows you to select the source (SysOneMgr, etc.) and display any or all categories of error, warnings or information events. Press the OK button to display those events. If you press the RESET button on this window, all sources and categories are displayed.

Pressing the Filter ID button brings up a window that allows you to display events by ID number. Press the ALL button; it then becomes blank. Enter the desired ID using the number buttons. That number will then appear on the blank button. Press the OK button to display those selected events.

NOTE: the Clear key is active only if you are in the Advanced service mode. When you press this key, a dialog box “Do you really want to clear the service log?” appears. If you press the Yes button, the service log will be cleared.

Information contained in each type log may be viewed using various filters:

Selecting a Date filter allows the log to be sorted by first or last event, or to be filtered by specified date ranges. See Figure 2-15C.

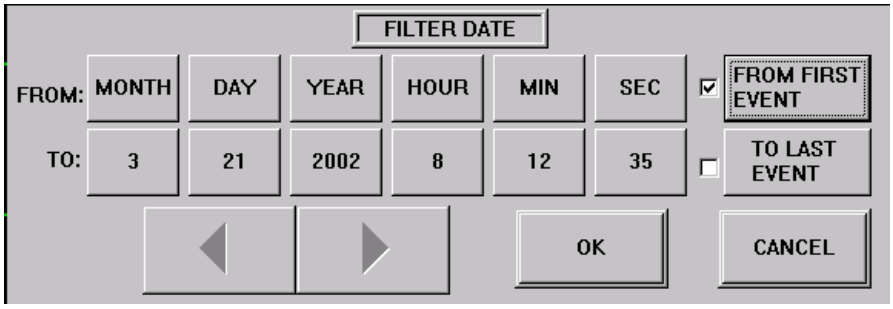


Figure 2-15C. Alarm - Filter Date

Selecting Filter Event ID and entering a specific event ID will display only the entries that match the selected ID. See Figure 15D.

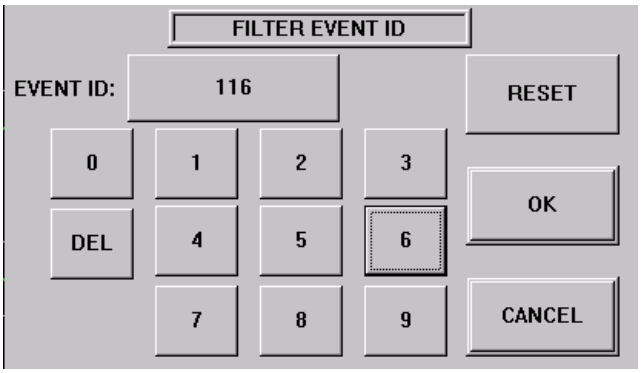


Figure 2-15D. Alarm - Filter Event ID

Selecting Filter Source, Category and Type provides numerous filters allowing for customized views of entries that meet several filtering criteria.
See Figure 2-15E.

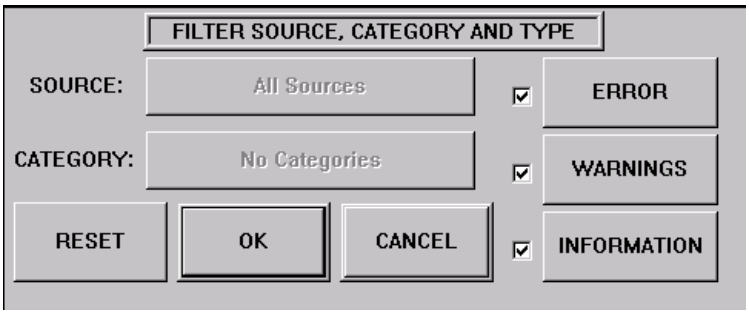


Figure 2-15E. Alarm - Filter Source

2.6.1 Save Service Log window

When the LOCAL SAVE button is pressed, all logs are saved to the file c:\nad\datfiles\slog.txt. All buttons on this window are disabled while the service log is being saved.

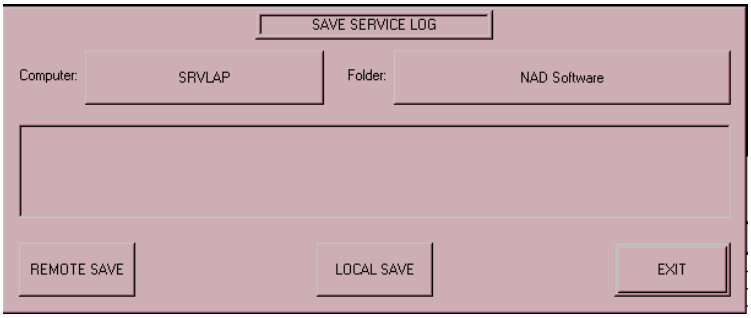


Figure 2-15F. Save Service Log window

When the Computer button is pressed, a software keyboard is displayed that allows you to change the computer name. You can also select from the last five computer names entered. The default computer name is SRVLAP.

When the Folder button is pressed, a software keyboard is displayed that allows you to change the folder name. You can also select from the last five folder names entered. The default folder name is NAD Software.

CAUTION: Before connecting an external computer to the Narkomed 6000, verify the computer is running a virus protection application set to scan all files and is enabled. You must also verify that the definition files and scan engines are of current vintage.

When the REMOTE SAVE button is pressed, all buttons on the SAVE SERVICE LOG window are disabled. If the NM6000 is unable to find the remote computer, an error message is displayed, the buttons are enabled, and no further processing occurs. If the remote computer is found, the NM6000 attempts to create a directory in the format \\computer name\folder name\nm6k\SNXXXXXXXX. The NM6000 will then copy all the files from the c:\nad\datfiles directory and the NT event file APPEVENT.EVT to the remote location. The NM6000 will then save the current service log to the remote location using the name slog_date_time.txt where the date and time will be replaced with the current date and time. If the NM6000 is unable to copy the files, an error message is displayed and the buttons are enabled.If the service log is successfully saved, a message that contains the path and name of the saved service log will be displayed and the buttons will be enabled.

The saved service log is an ASCII text file in the line format `date time~source name of event~category~event ID~event type~description~data`.

Each line is a separate event log entry. Most entries will contain no data.

2.6A Service Log Entry Detail

Software Version 1.05 adds the following Service Log Entry Detail window. If a service log entry is pressed while the log keys are enabled, this window is displayed, showing detailed information about the currently selected event. The selected event will be highlighted in blue in the event log. A box on this window displays the following:

ERROR in red for error events
WARNING in yellow for warning events
INFORMATION in white for informational events

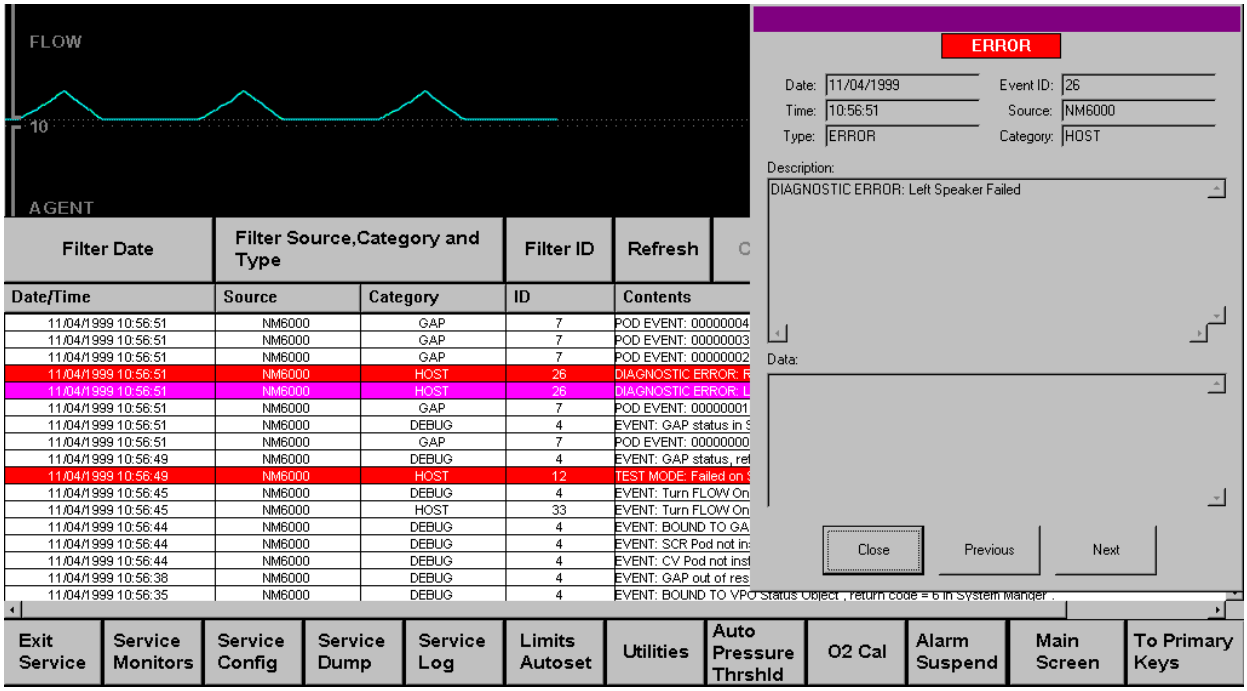


Figure 2-15G. Service Log Entry Detail window

Pressing the Previous button causes the previous event to be higlighted in blue on the service log, and the information for the previous event is displayed in the Service Log Entry Detail window. The last selected entry returns to its appropriate color. Pressing the Previous button for the most recent entry causes no changes.

Pressing the Next button causes the next event to be highlighted in blue on the service log, and the information for the next event is displayed in the Service Log Entry Detail window. The last selected entry returns to its appropriate color. Pressing the Next button for the oldest entry causes no changes.

Pressing the Close button removes the Service Log Entry Detail window, and the last selected entry in the service log returns to its appropriate color.

2.7 NM6000 Event Log Transfer Using Service Laptop with Windows 95, 98 or Me

The following procedure allows the Narkomed 6000's event log and POD logs to be downloaded to a service laptop using either Windows 95 or 98 operating system. The logs are saved to the laptop's hard drive NM6K folder for subsequent analysis. (Refer to Section 2.7A if using a service laptop with Windows NT operating system.) The following items are needed:

--Service laptop computer, IBM PC or compatible
with: Type II or larger PCMCIA slots
500 MB hard drive minimum
Windows 95 or 98
Etherlink card configured to share files
--Vitalan cable P/N 4113989-001

CAUTION: Before connecting an external computer to the Narkomed 6000, verify the computer is running a virus protection application set to scan all files and is enabled. You must also verify that the definition files and scan engines are of current vintage.

2.7.1 Configure the laptop as shown in Figure 2-16.

2.7.2 With the Narkomed 6000 System Power switch at STANDBY and the laptop computer Off, connect the laptop's etherlink cable to any Vitalbus port on the Hub. See Figure 2-17.

2.7.3 Power up the laptop computer and the NM6000. Press the Divan Standby key to cancel the ventilator self-test, and wait for the power up diagnostics to finish. Verify the green LED on the Lancard cable is illuminated. (If the laptop computer prompts for a password, select Cancel.)

2.7.4 Press the Setup key and select the About tab on the About System Software notebook. Enter the primary service menu code and select OK on the Service Mode screen to enter the USER ACCESS service mode.

2.7.5 Under the Service Mode screen select the NM6000 tab and enter the advanced service code to enter the ADVANCED ACCESS mode.

2.7.6 Press the Service Config key and select the SERVICE key. Using the NM6000 on-screen keyboard, enter your service ID number then press OK.

2.7.7 Press the Service Log key to call up the service event log.

2.7.8 Press the Refresh key to refresh the logs. During this activity the Save key text will turn gray. When the Save key turns black again, press the Save key to bring up the SAVE SERVICE LOG dialog.

2.7.9 If the laptop computer name is not SRVLAP or the desired folder is not NAD Software, touch these keys to make the required edits.

2.7.10 Press the REMOTE SAVE button. If the NM6000 is unable to find the remote computer, an error message is displayed. If the remote computer is found, the NM6000 attempts to create a directory in the format \\computer name 'SRVLAP'\folder name 'NAD Software'\nm6k\SNXXXXXXXX.

1. Turn on the laptop if necessary

Install the Drivers

2. Ensure that the Ethernet card and driver are installed.

Set the Computer Name and IP Address

3. Select “Start->Programs->Windows Explorer” from the task bar.
4. Right click “Network Neighborhood” or My Network Places” if using Windows Me. If there is not a selection for “Network Neighborhood” or “My Network Places”, select Start→Settings→ Control Panel→Network. Launch the install wizard to load “Client for Microsoft Networks.”
5. Select the PROPERTIES button.
6. Select the “Identification” tab.
7. Enter the following data (as necessary):
   Computer Name: srvlap
   Work Group: Service
8. Select the “Configuration” tab.
9. Select the “TCP/IP” item (looks like an electrical plug).
10. Press the “Properties” button.
11. Select the “IP Address” tab.
12. Select the “Specify an IP address” radio button.
13. Set the following fields:
    IP Address: 172.28.0.130
    Subnet Mask: 255.255.0.0
14. Press OK.

Share the directories

15. Select the “Access Control” tab.
16. Select the “Share-level access control” radio button.
17. Select the “Configuration” tab.
18. Click on “File and Print Sharing” button.
19. Select the “I want to be able to give others access to my files” item.
20. Press OK, and press OK again to exit the Network dialog box.
21. Ensure that the directory “NAD Software”\NM6K exists on the C:\ drive.
22. Right click the “NAD Software” directory.
23. Select the “Sharing” menu item.
24. Select the “Sharing” tab.
25. Select the “Share As...” radio button.
26. Ensure that “NAD Software appears as the share name.
27. Select the “Full” Access type radio button.
28. Press APPLY, then OK.

Turn off the Dial-Up modem (if applicable)

29. Right click “My Computer:”
30. Select the Properties menu item.
31. Select the “Device Manager” tab.
32. Expand “Network Adapters” by clicking the “+” box on the line.
33. Select the Dial-up adapter.
34. Select the PROPERTIES button.
35. Ensure that “Disable in this hardware profile” is checked.
36. Press OK.

Clean up and Reboot

37. Close all open windows.
38. Select “Start->Shut Down” from the task bar.
39. In the “Shut Down Windows” dialog box, select “Restart the Computer?”
40. Press “Yes”; allow several minutes for the system to reboot.

Figure 2-16. Configuring the Windows 95, 98 Laptop

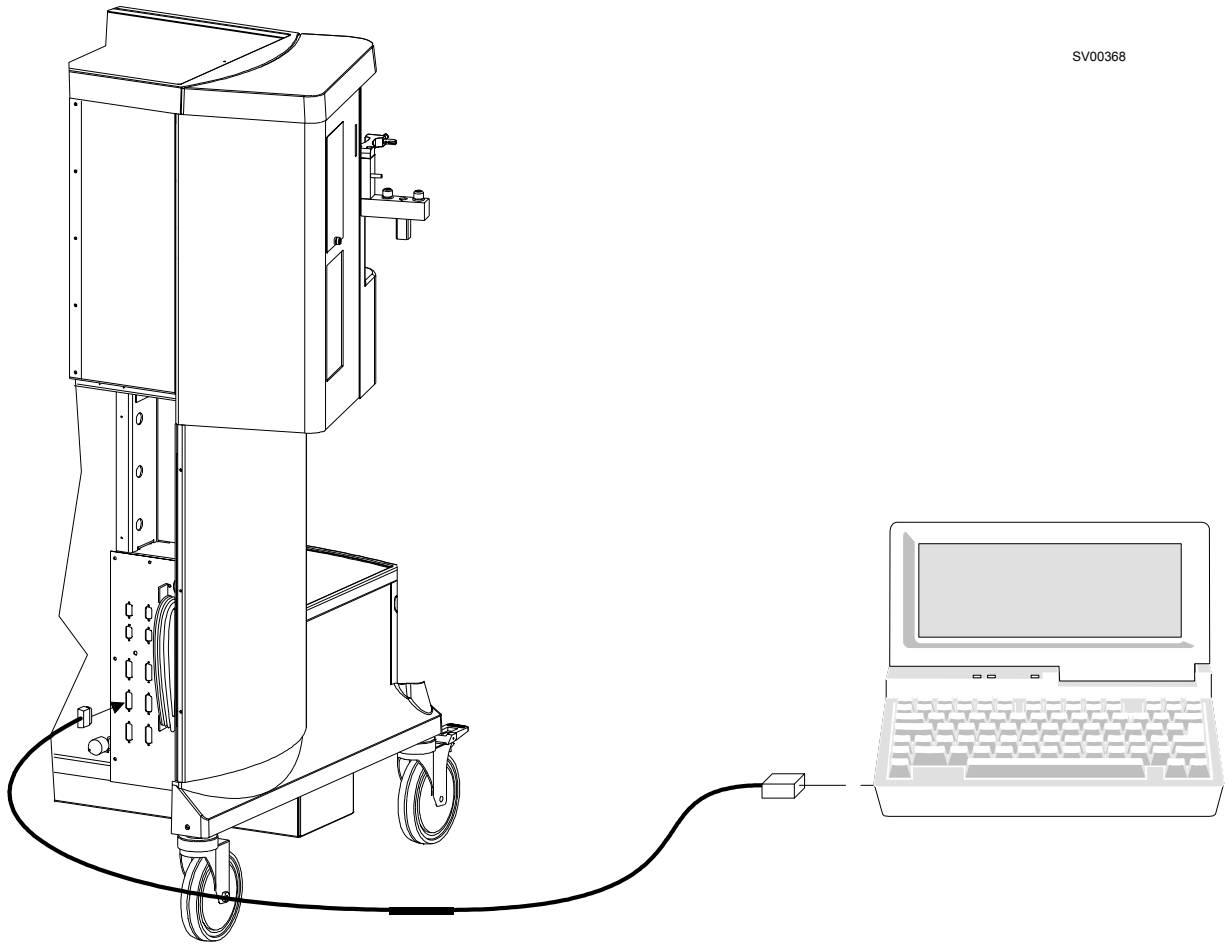


Figure 2-17. Connections for Windows 95, 98 Event Log Transfer

2.7.11 After successful completion of an Event Log transfer, the file will be located on the laptop computer as shown in Figure 2-18.

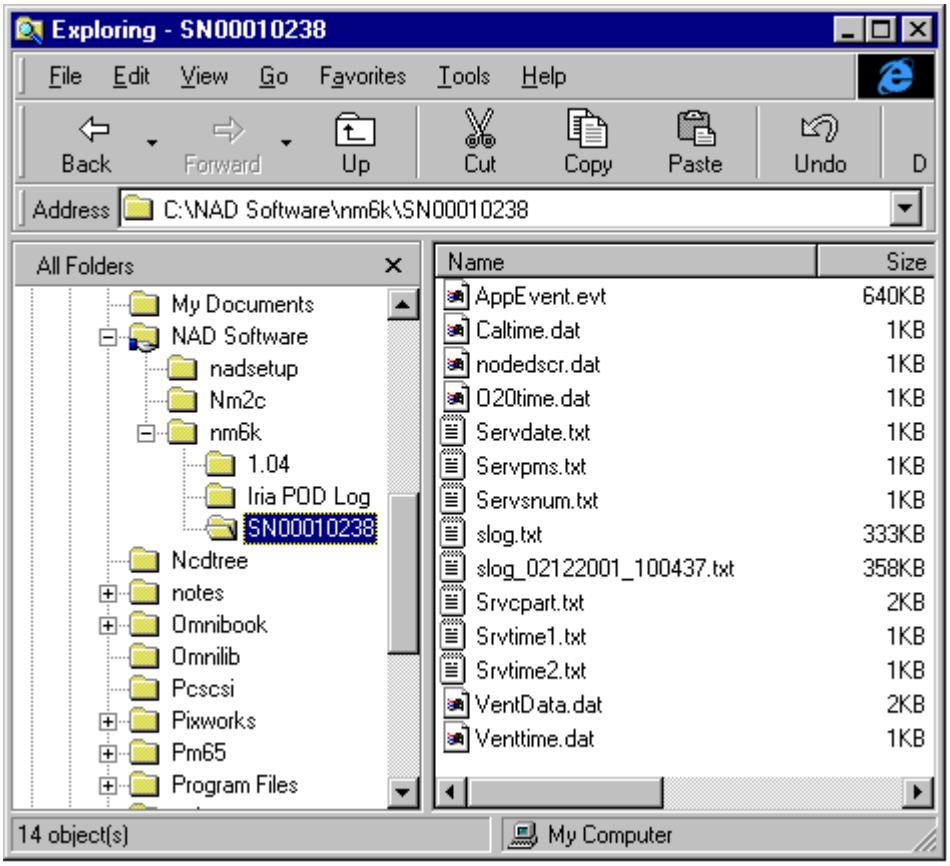


Figure 2-18. Laptop Computer File Example

2.7.12 Verify the fourteen files transferred properly to the laptopo and forward the files to DMI's Technical Support Department for further analysis.

NOTE: The Appevent.evt, Slog.txt, and Slog_xxxxxxxx_xxxxxx.txt files must each contain at least 100KB of data.

Figure 2-19. Deleted

Figure 2-20. Deleted

Figure 2-21. Deleted

2.7A NM6000 Event Log Transfer Using Service Laptop with Windows NT

The following procedure allows the Narkomed 6000's event log and POD logs to be downloaded to a service laptop using Windows NT operating system. The logs are saved to the laptop's hard drive NM6K folder for subsequent analysis. (Refer to Section 2.7 if using a service laptop with Windows 95 or 98 operating system.) The following items are needed:

--Service laptop computer, IBM PC or compatible
with: Type II or larger PCMCIA slots
500 MB hard drive minimum
Windows NT
Etherlink card configured to share files
--Vitalan cable P/N 4113989-002

CAUTION: Before connecting an external computer to the Narkomed 6000, verify the computer is running a virus protection application set to scan all files and is enabled. You must also verify that the definition files and scan engines are of current vintage.

2.7A.1 With the Narkomed 6000 System Power switch set to STANDBY and the laptop computer Off, connect the laptop's etherlink cable to any Vitalbus port on the Hub as shown in Figure 2-21A.

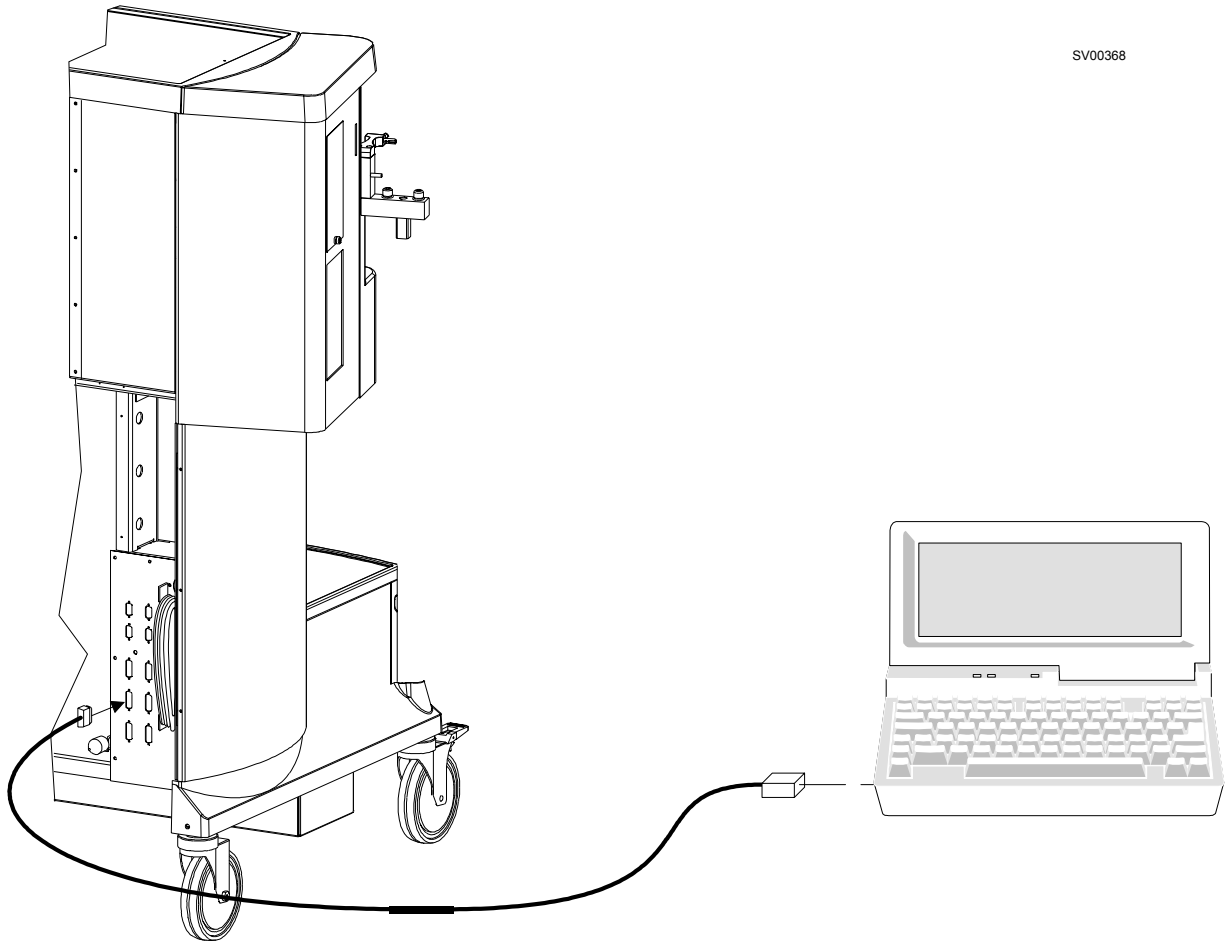


Figure 2-21A. Connections for Windows NT Event Log Transfer

2.7A.2 Power up the laptop computer and the NM6000. Press the Divan Standby key to cancel the ventilator self test. When prompted for a network password, enter “password” and wait for the power up diagnostics to finish.

Verify the network workgroup. If unknown, this information can be found as follows: From the Windows NT desktop: right click on Network Neighborhood; select Priorities, select the Identification tab. The workgroup will be listed in one of the text boxes displayed. If the workgroup is not “Goldisk”, use procedure 2.7B. It is also highly recommended that you contact your information systems admistrator to make the necessary changes to the laptop. (To work correctly, workgroup must be “Goldisk”, administrator password must be “NAD123NAD123”)

2.7A.3 Verify the computer name for the laptop; ie: SRVLAP028. See Figure 2-21B. If unknown, this information can be found as follows:
From the Windows NT Desktop:

-- Right-click on Network Neighborhood

-- Select Properties

-- Select the Identification tab

-- The computer name will be listed in one of the text boxes displayed

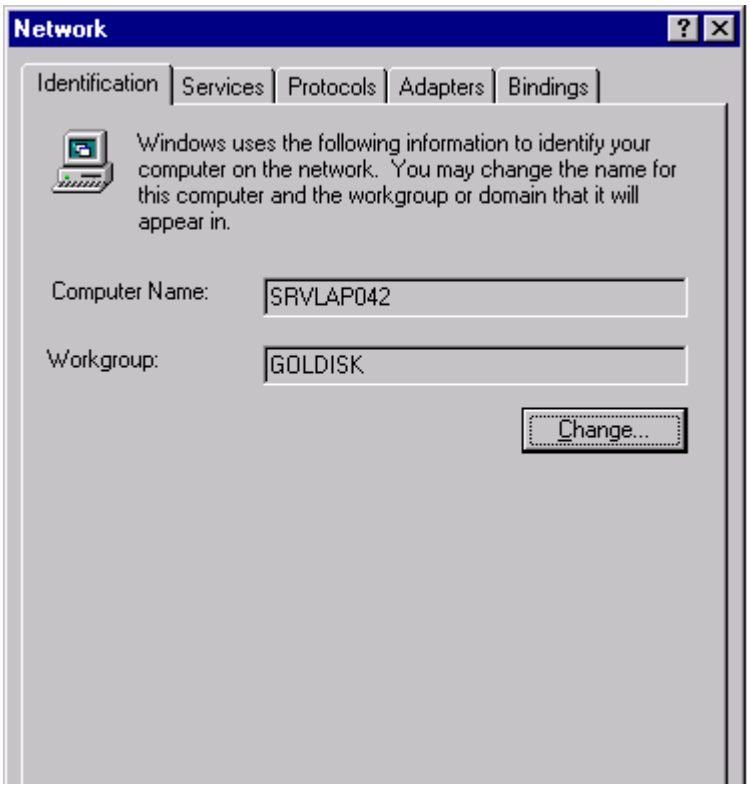


Figure 2-21B. Computer Name Identification Screen

2.7A.4 Verify the laptop TCP/IP address is updated to communicate with the NM6000. If unknown, this information can be found as follows:

-- From the Network dialog in Figure 2-21B, click on the Protocols tab.

--A dialog window shall appear as in Figure 2-21C

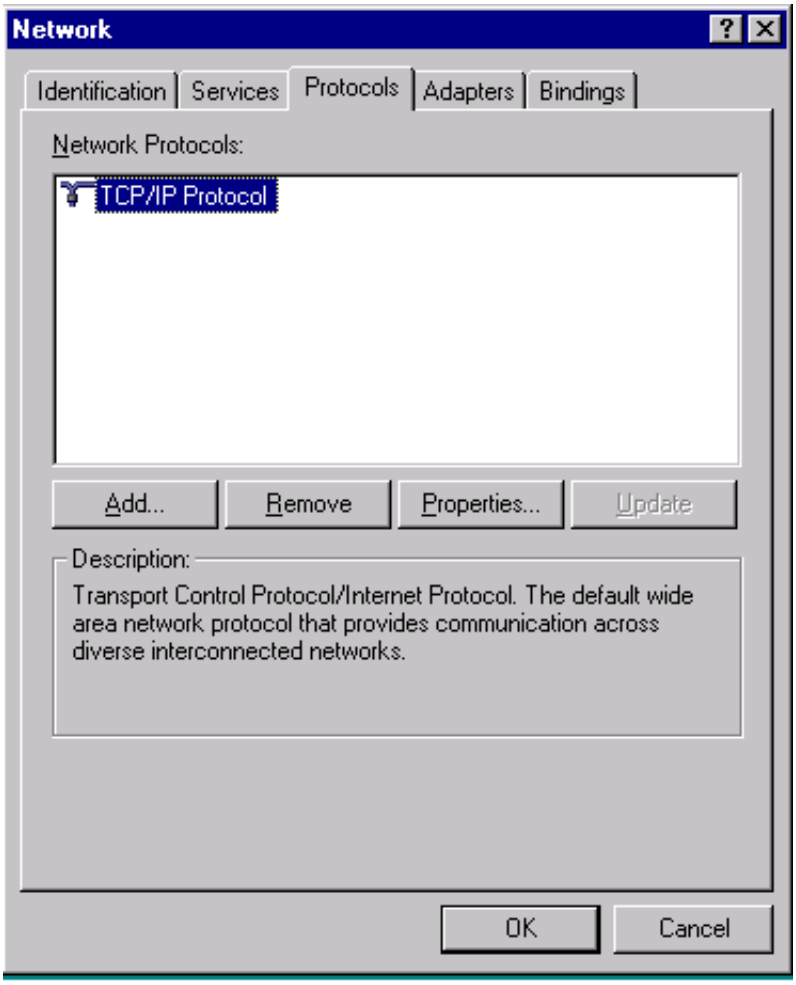


Figure 2-21C. Protocols Tab

-- Click once on the TCP/IP Protocol entry in the list of Network Protocols.

-- Click the Properties button

-- A dialog shall appear as in Figure 2-21D.

--Using the drop down arrow, select the correct Ethernet adapter.

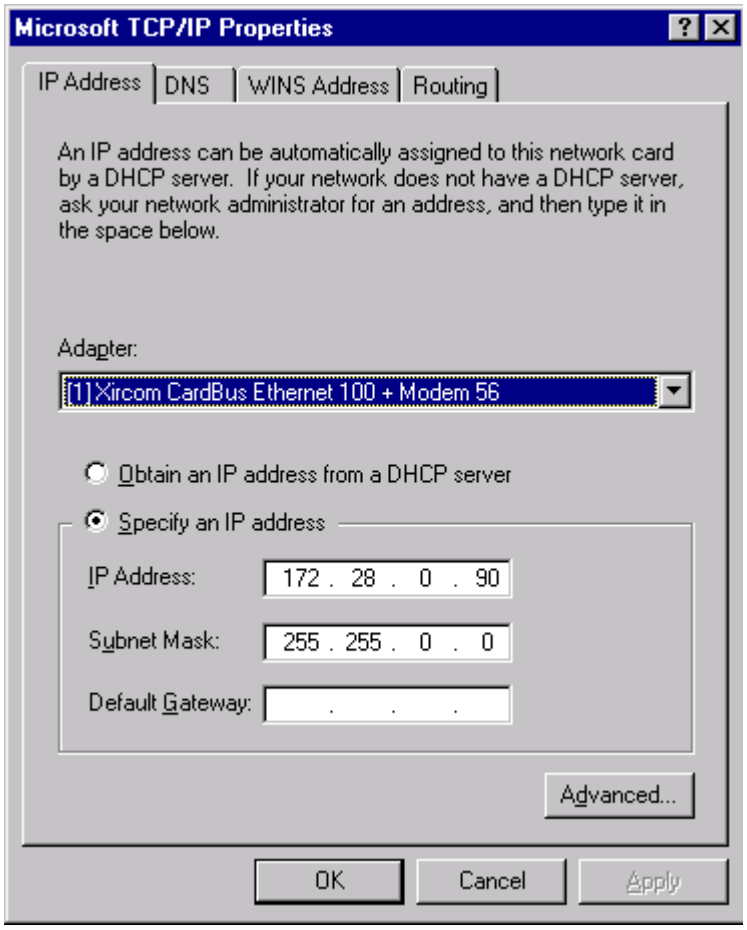

Microsoft TCP/IP Properties
IP Address
DNS
WINS Address
Routing
An IP address can be automatically assigned to this network card by a DHCP server. If your network does not have a DHCP server, ask your network administrator for an address, and then type it in the space below.
Adapter:
[1] Xircom CardBus Ethernet 100 + Modem 56
Obtain an IP address from a DHCP server
Specify an IP address
IP Address:
172 . 28 . 0 . 90
Subnet Mask:
255 . 255 . 0 . 0
Default Gateway:
Advanced...
OK
Cancel
Apply

Figure 2-21D. TCP/IP Properties

-- Select Specify an IP address radio button

-- Enter the above shown IP Address (after entering the second set of IP address numbers, use the space bar to advance to the third and fourth sets.)

-- Enter the above shown Subnet Mask

-- Select OK to close the TCP/IP Properties dialog window

NOTE: If the MS loop adapter interferes with the proper operation of the TCP/IP adapter, contact your IS administrator.

-- Select OK to close the Network dialog window

-- Shut down and restart the laptop computer for the new Network settings to take effect. (When prompted for a password, enter “password”)

2.7A.5 Verify the laptop file folders are configured to share with the NM6000. If unknown, this information can be found as follows:

-- Right-click the Start key

-- Select Explorer

-- At the (C:) select the NAD Software folder (with a hand under it). If none is present, create it:

File...New...Folder, name it NAD Software

-- If a hand was not under the NAD Software folder, modify it:

Right-click (ALT + ENTER) Sharing, select Shared As, Permission, Type, Full Control, OK, Apply, OK

You should now see a hand under the NAD Software folder as shown in Figure 2-21E

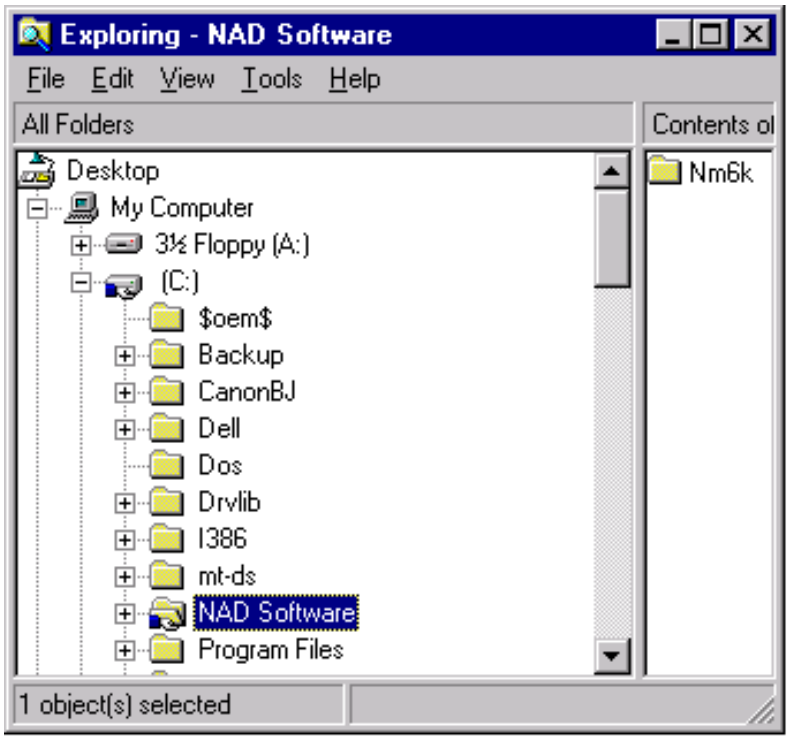


Figure 2-21E. NAD Software Folder

-- Select NM6K folder. If none is present, create it:

Select NAD Software, File...New...Folder, name it NM6K

2.7A.6 On the NM6000, press the Setup key and select the About tab on the About SystemSoftware notebook. Enter the primary service menu code and select OK on the Service Mode screen to enter the USER ACCESS service mode.

2.7A.7 Under the Service Mode screen select the NM6000 tab and enter the advanced service code to enter the ADVANCED ACCESS mode.

2.7A.8 Press the Service Config key and select the SERVICE key. Using the NM6000 on-screen keyboard, enter your service ID number, then press OK.

2.7A.9 Press the Service Log key to call up the service event log.

2.7A.10 Press the Refresh key to refresh the logs. During this activity the Save key text will turn gray. When the Save key text turns black again, press the Save key to call up the SAVE SERVICE LOG dialog.

2.7A.11 If the Laptop computer name is not SRVLAP028 or the desired folder is not NAD Software, touch these keys and make the required edits.

2.7A.12 Press the REMOTE SAVE button. If the NM6000 is unable to find the remote computer, an error message is displayed. If the remote computer is found, the NM6000 attempts to create a directory in the format \\computer name'SRVLAP'\folder name 'NAD Software'\nm6k\SNXXXXXXXX. (The S/N listing is derived from the NM6000 CONFIGURATION page.)

2.7A.13 After successful completion of an Event Log transfer, the file will be located on the laptop computer as shown in Figure 2-18.

.

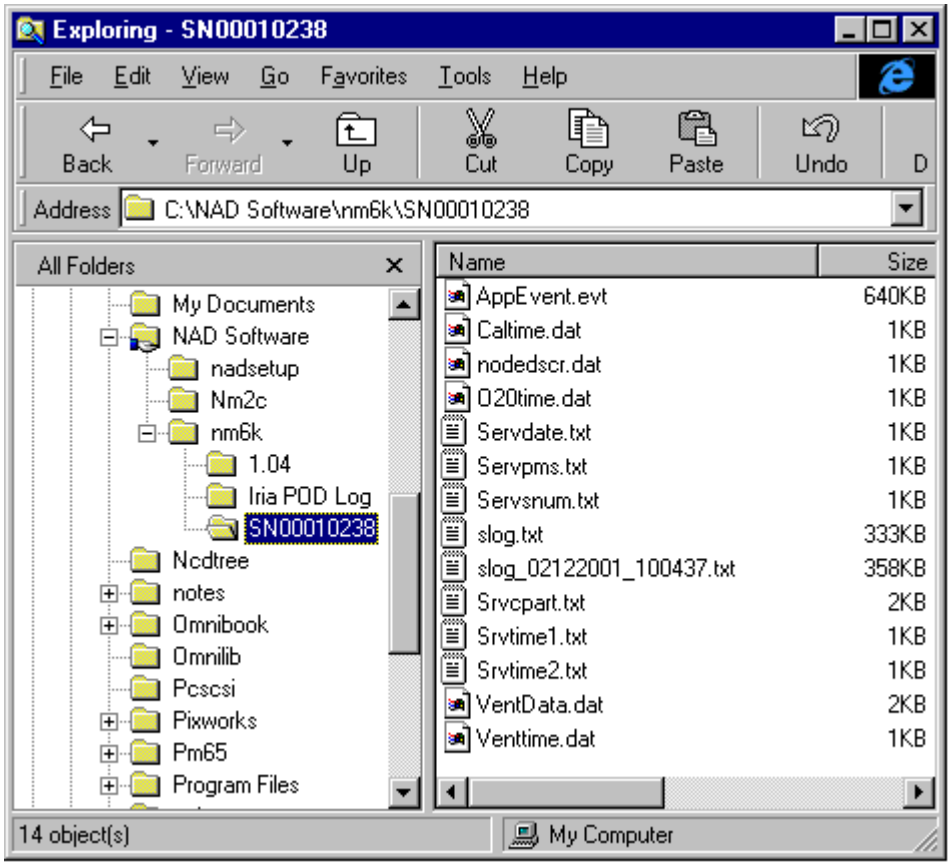


Figure 2-21F. Laptop Computer File Example

2.7A.14 Verify the fourteen files transferred properly to the laptopo and forward the files to DMI's Technical Support Department for further analysis.

NOTE: The Appevent.evt, Slog.txt, and Slog_xxxxxxxx_xxxxxx.txt files must each contain at least 100KB of data.

2.7B. Event Log Transfer: Alternate Procedure

2.7B.1 Verify the computer name of the laptop, ie: SRVLAP028. See Figure 2-21G. If unknown, this information can be found as follows:

From the Windows NT Desktop:

-- Right-click on Network Neighborhood

-- Select Properties

-- Select the Identification tab

-- The computer name will be listed in one of the text boxes displayed

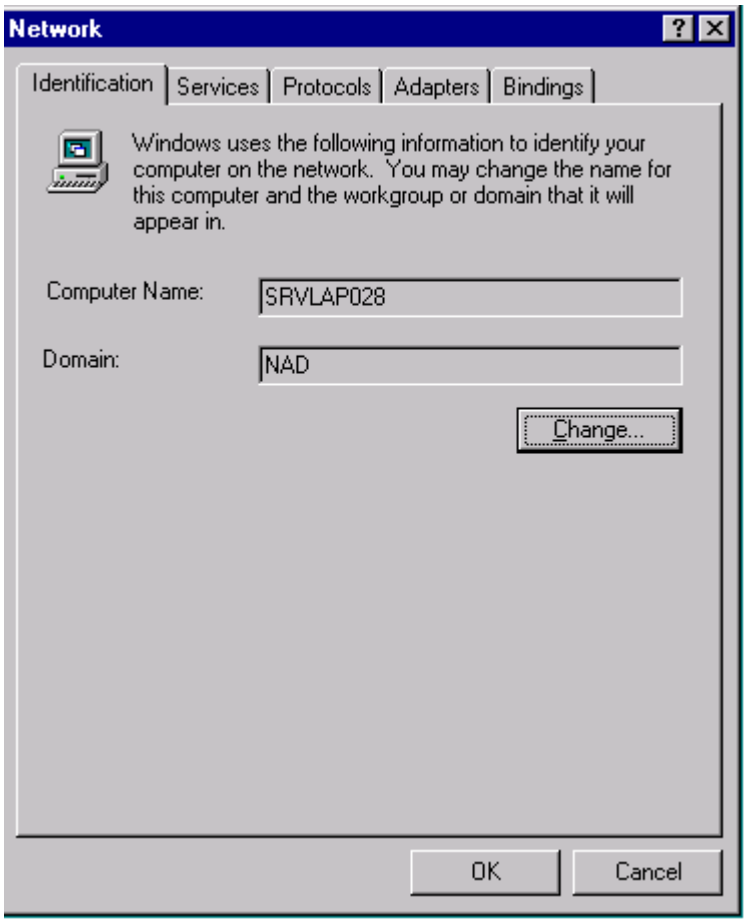


Figure 2-21G. Computer Name Identification Screen

2.7B.2 Update the TCP/IP address to communicate with the NM6000.

-- From the Network dialog in Figure 2-21G, click on the Protocols tab.

-- A dialog window shall appear as in Figure 2-21H.

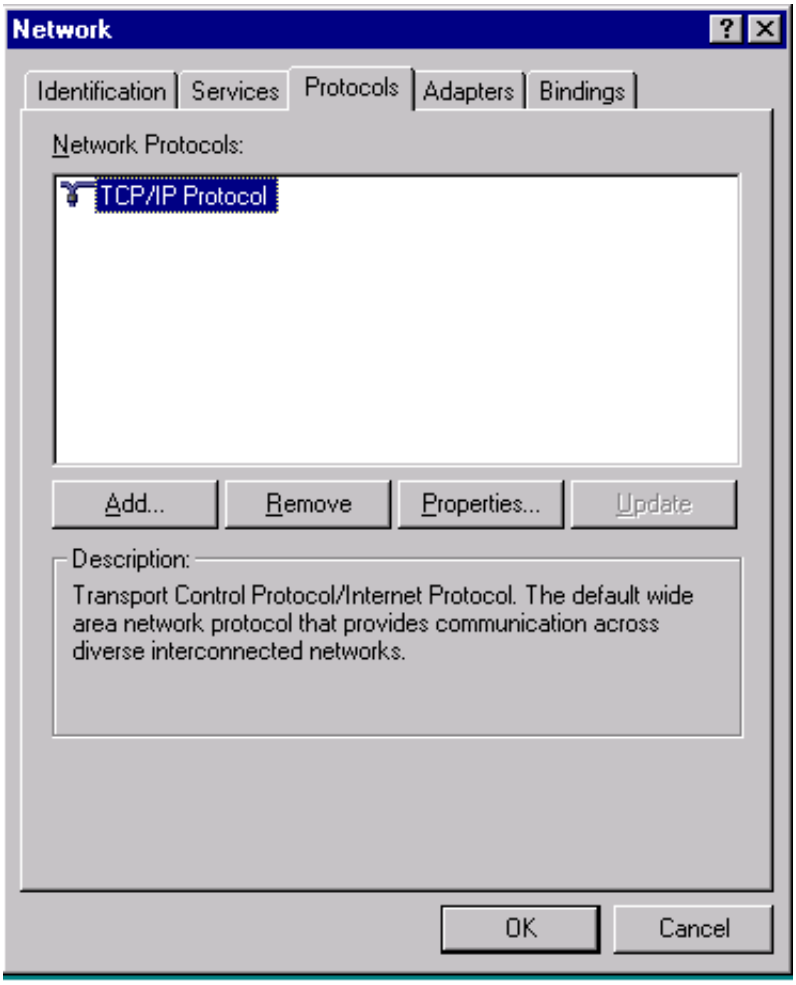


Figure 2-21H. Protocols Tab

-- Click once on the TCP/IP Protocol entry in the list of Network Protocols.

-- Click the Properties button

-- A dialog shall appear as in Figure 2-21J.

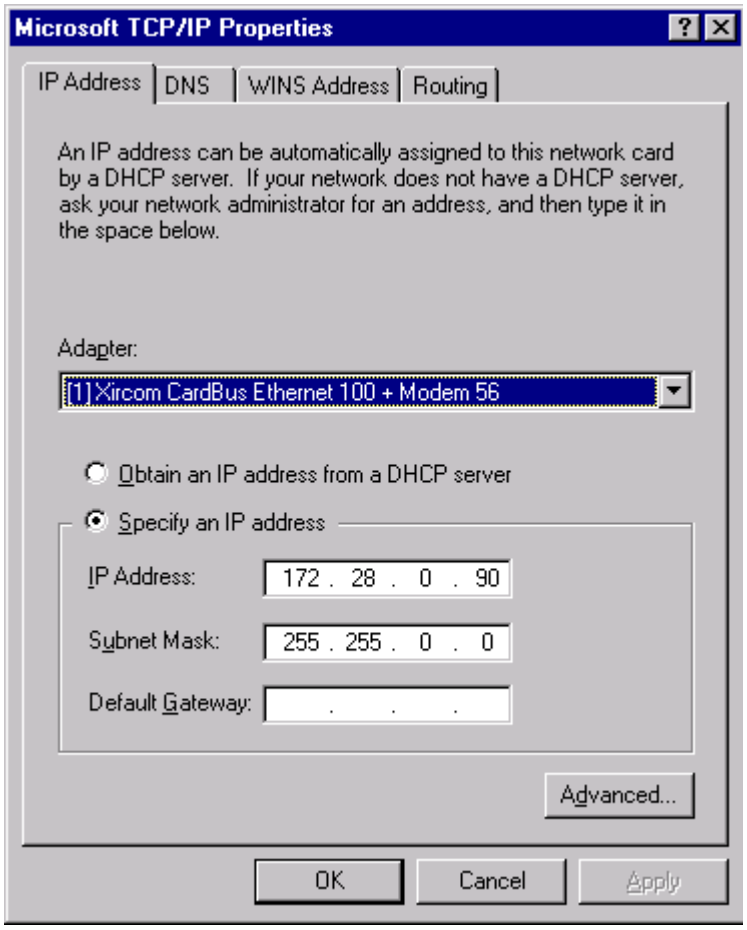

Microsoft TCP/IP Properties
IP Address
DNS
WINS Address
Routing
An IP address can be automatically assigned to this network card by a DHCP server. If your network does not have a DHCP server, ask your network administrator for an address, and then type it in the space below.
Adapter:
[1] Xircom CardBus Ethernet 100 + Modem 56
Obtain an IP address from a DHCP server
Specify an IP address
IP Address:
172 . 28 . 0 . 90
Subnet Mask:
255 . 255 . 0 . 0
Default Gateway:
Advanced...
OK
Cancel
Apply

Figure 2-21J. TCP/IP Properties

-- Select Specify an IP address radio button

-- Enter the above shown IP Address (after entering the second set of IP address numbers, use the space bar to advance to the third and fourth sets.)

-- Enter the above shown Subnet Mask

-- Select OK to close the TCP/IP Properties dialog window

-- Select OK to close the Network dialog window

-- Shut down and restart the laptop computer for the new Network settings to take effect.

2.7B.3 Configuring the Laptop:

On the Laptop computer:

-- Right-click the Start key

-- Select Explorer

-- At the (C:) select NAD Software folder (with a hand under it). If none is present, create it:

File...New...Folder, name it NAD Software

-- If a hand was not under the NAD Software folder, modify it:

Right-click (ALT + ENTER) Sharing, select Shared As, Permission, Type, Full Control, Apply, OK

-- Select NM6K folder. If none is present, create it:

File...New...Folder, name it NM6K

-- Select the Event Log folder. If none is present, create it:

File...New...Folder, name it Event Log

You should now see a hand under the NAD Software folder as shown in Figure 2-21K.

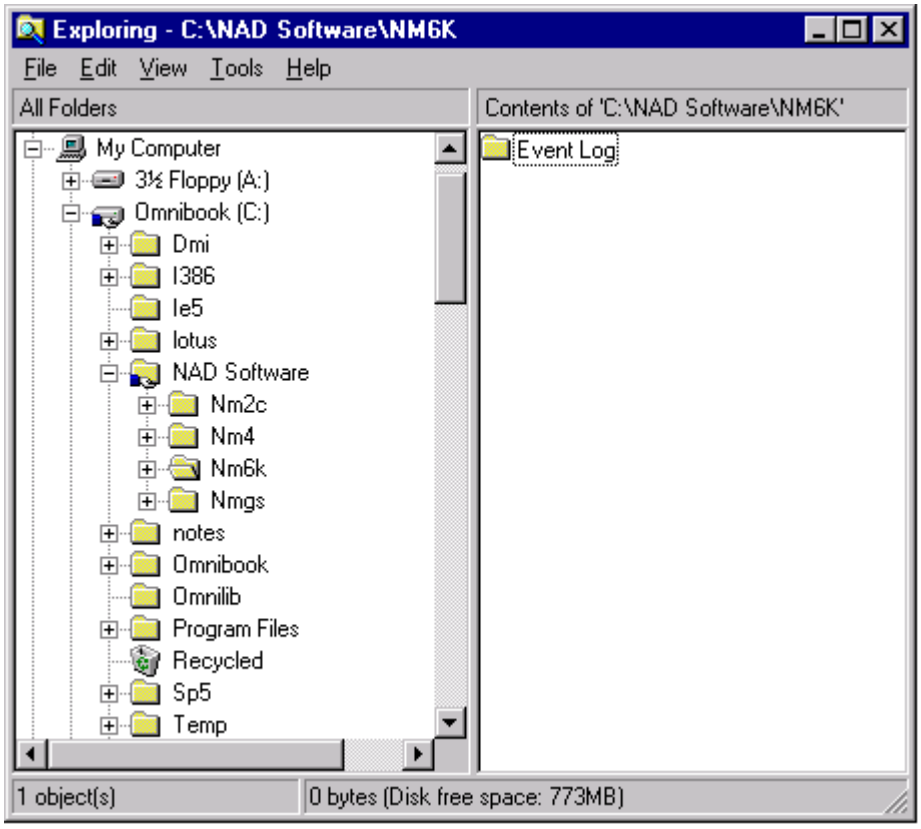


Figure 2-21K. Shared Event Folder

2.7B.4 Turn the Narkomed 6000 System Power switch to ON. Allow the system to complete its power up self diagnostic tests, then press Ctrl+F9, Alt+F9, and Ctrl-ESC on the NM6K keyboard to call up the Start menu.

NOTE: Use the Arrow and Tab keys to navigate through the selections.

-- Select Start...Find File or Folders

-- Look in: My Computer

-- In the Named list: select AppEvent.evt. If the dropdown window is empty, type in AppEvent.evt. See Figure 2-21L.

-- Select Find Now

-- Verify that the file is highlighted and press Ctrl+C to copy the file.

-- Click on the X at the top right to close the Find window.

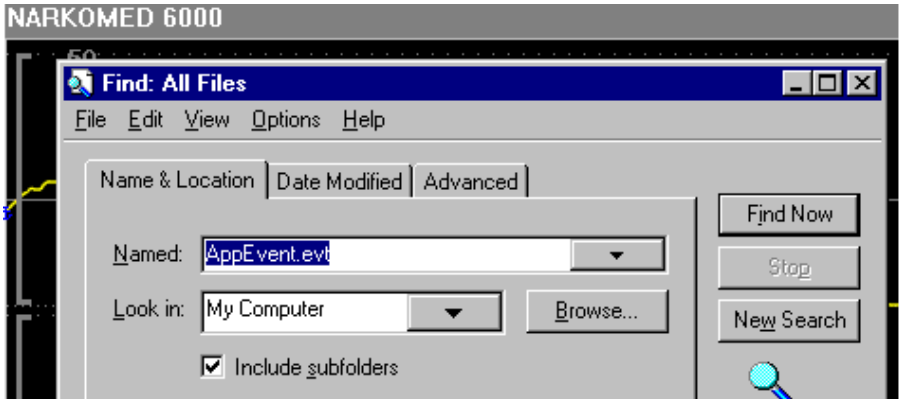


Figure 2-21L. Find AppEvent.evt Screen

-- Press the Window key or Ctrl+Esc to bring up the task bar.

-- Type R for Run

-- In the Open list: select \\SRVLAP028, then select OK. If the dropdown window is empty, type in \\SRVLAP028.

NOTE: If the computer name is not SRVLAP028, type in \\ followed by the appropriate name as previously identified.

-- Select OK

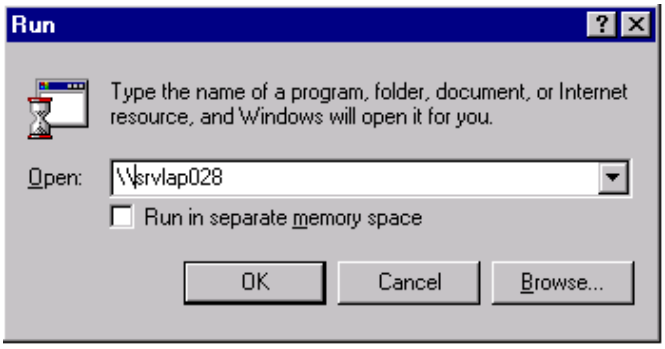


Figure 2-21M. Run Box

2.7B.5 A Network Password window should soon appear indicating an incorrect user name or password. This is normal. Enter the computer's name (SRVLAP028) in the Connect As: field by removing the "\\" portion of this listed field and enter the word "password" in the Password field. Press the Enter key.

NOTE: If the host NM6000 cannot locate the networked laptop computer, recheck the laptop's configuration setting.

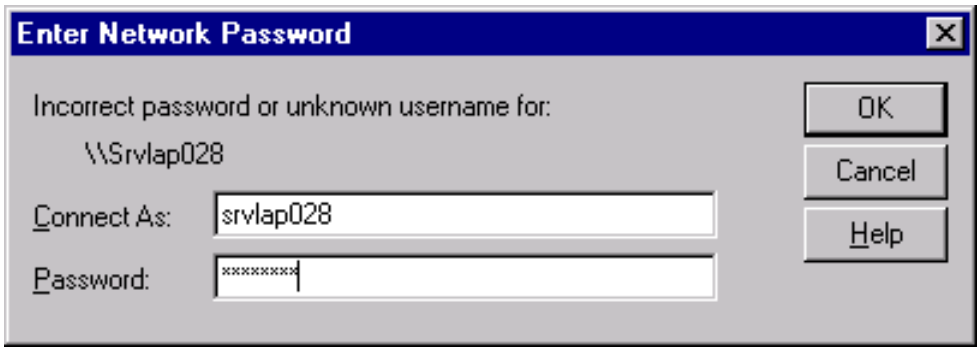


Figure 2-21N. Network Password

2.7B.6 A window should appear on the NM6000 showing all shared folders on the laptop, as identified with a hand under the folder. If no shared folders appear, recheck the selections made in the Configuring the Laptop section.

-- Open the EventLog Folder (SRVLAP028\NAD Software\NM6K\Eventlog)

-- Press CTRL+V to paste the file to the laptop.

-- Verify that the AppEvent.evt file appears on the NM6000 screen.

-- Select the AppEvent.evt file.

-- Select File, Rename, move the cursor to the left of the file name and key in the 5-digit NM6000 serial number followed by a space.

-- Press Enter

-- Close all open windows

Verify the file transferred properly to the laptop, and forward the file to DMI's technical support department.

NOTE: The Appevent.evt file must contain at least 100 kB of data.

2.7B.7 Restoring your original Laptop Computer's Network settings

After you have successfully obtained the NM6000 NT Event log, it is necessary to restore your original laptop Network settings.

From the Windows NT Desktop:

-- Right-click on Network Neighborhood

-- Select Properties

-- Select the Protocols tab.

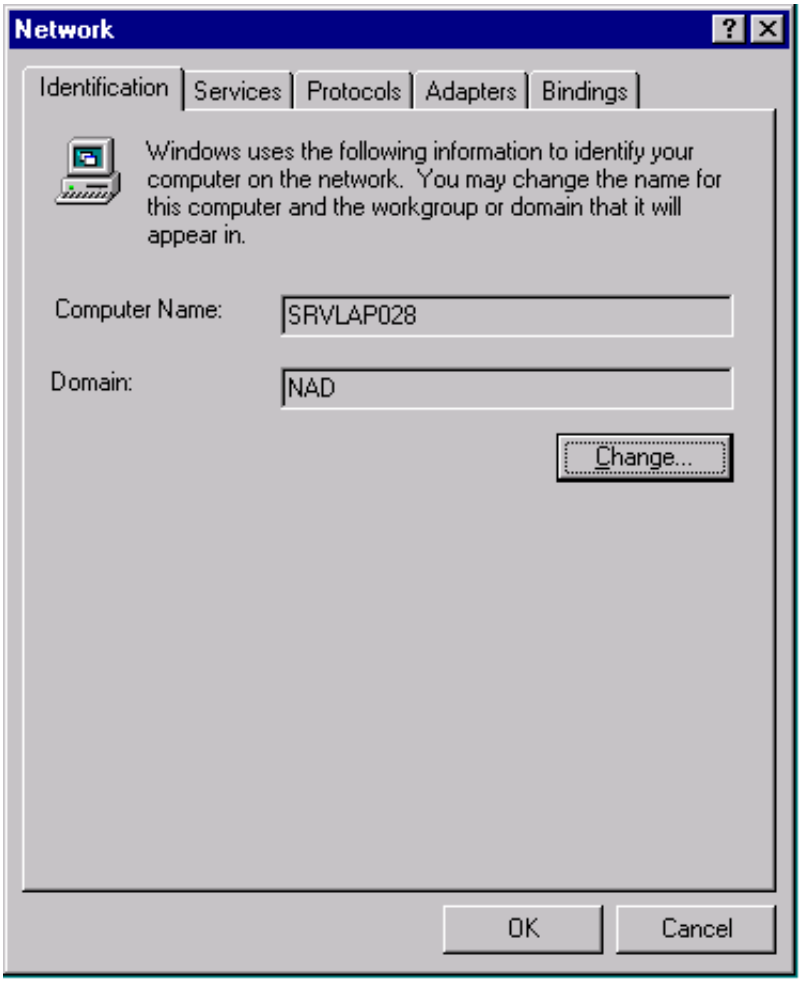


Figure 2-21P. Computer Name Identification Screen

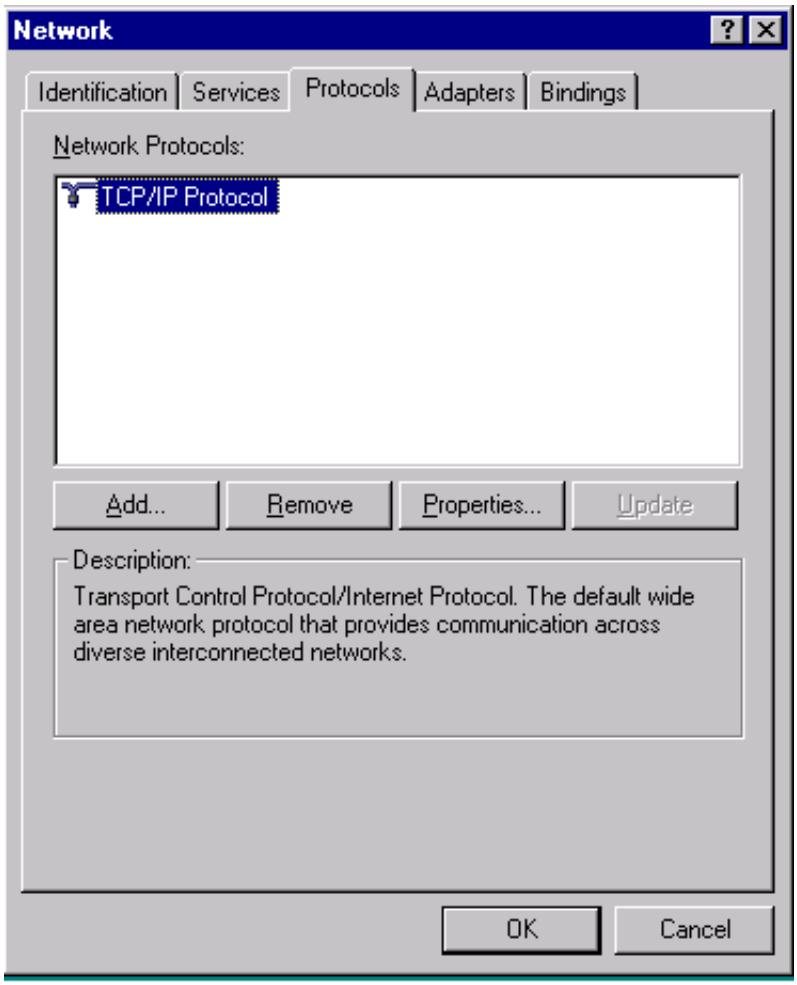


Figure 2-21R. Network Protocols tab

-- Click once on the TCP/IP Protocol entry in the list of Network Protocols.

-- Click on the Properties button

-- A dialog window shall appear as in Figure 2-21S.

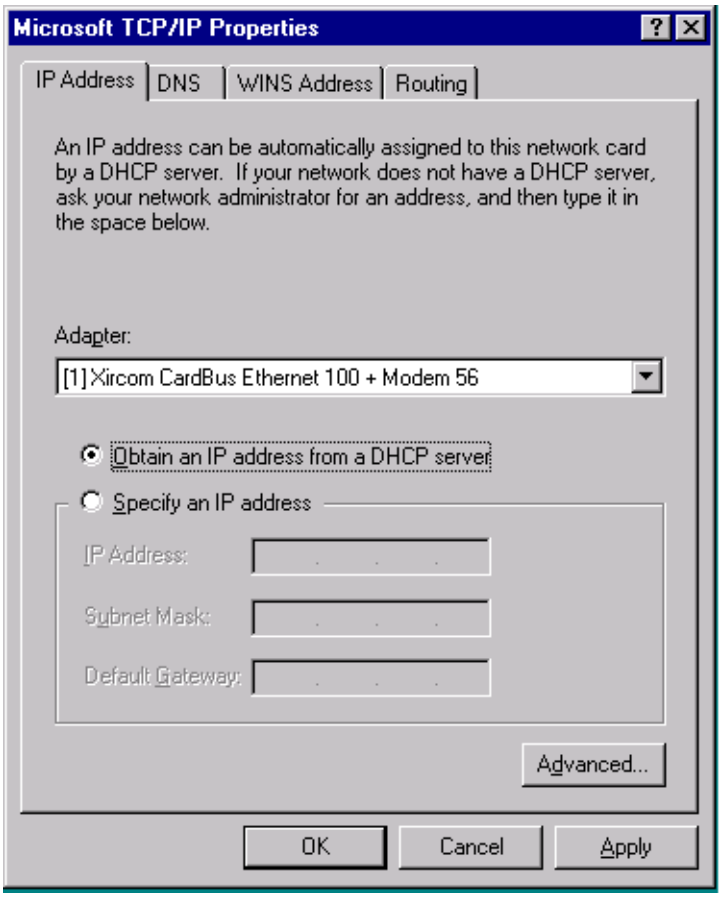

Microsoft TCP/IP Properties
IP Address
DNS
WINS Address
Routing
An IP address can be automatically assigned to this network card by a DHCP server. If your network does not have a DHCP server, ask your network administrator for an address, and then type it in the space below.
Adapter:
[1] Xircom CardBus Ethernet 100 + Modem 56
Obtain an IP address from a DHCP server
Specify an IP address
IP Address:
Subnet Mask:
Default Gateway:
Advanced...
OK
Cancel
Apply

Figure 2-21S. Microsoft TCP/IP Properties

-- Select Obtain an IP address from a DHCP server radio button. Select Yes at the Microsoft TCP/IP DHCP protocol dialog box.

-- Select OK to close the TCP/IP Properties dialog window

-- Select OK to close the Network dialog window

-- Shut down and restart your computer for the new Network settings to take effect

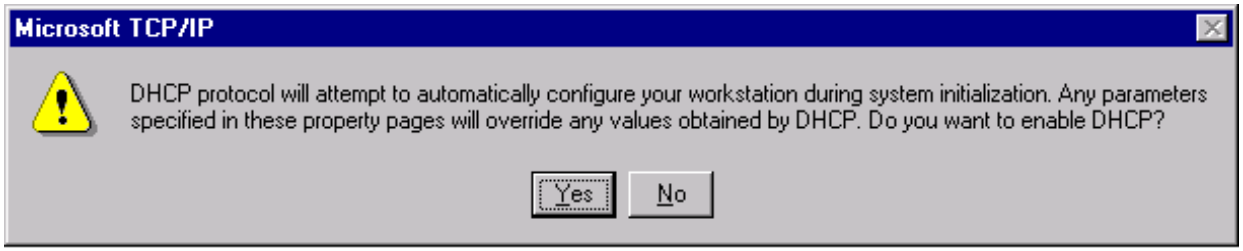

Microsoft TCP/IP
DHCP protocol will attempt to automatically configure your workstation during system initialization. Any parameters specified in these property pages will override any values obtained by DHCP. Do you want to enable DHCP?
Yes
No

Figure 2-21T. Microsoft TCP/IP DHCP Protocol

2.8 Divan Ventilator Power-Up Self Test

Upon system power-up from a cold start, the Divan ventilator enters an automatic self test sequence that takes approximately five minutes to complete. A flow chart of the self test sequence is shown beginning on the next page. The test proceeds according to the following schedule:

Electronic tests including all front panel LEDs, solenoids, fan, audible alarms
Prompts to set fresh gas flow to zero, APL valve to 30, close Y-piece
Pressure sensors automatic zero calibration
Power supply voltage tests (four voltages).
Piston position and motor current check
Control pressure test
Pneumatic leakage test on breathing system, and compliance correction
Pneumatic leakage test on fresh gas system
APL valve check

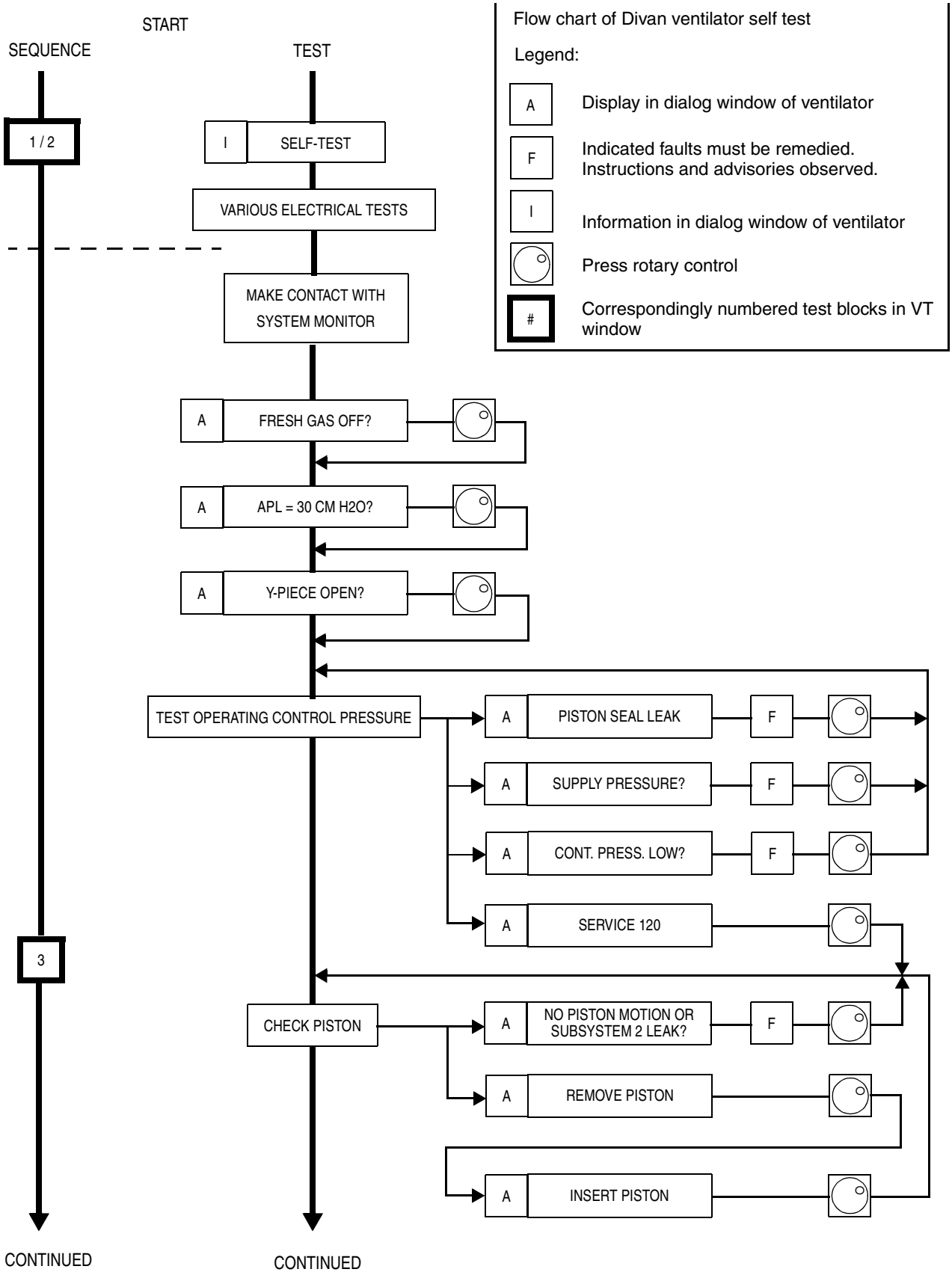
When the self test is completed the Divan display will indicate Standby Mode.

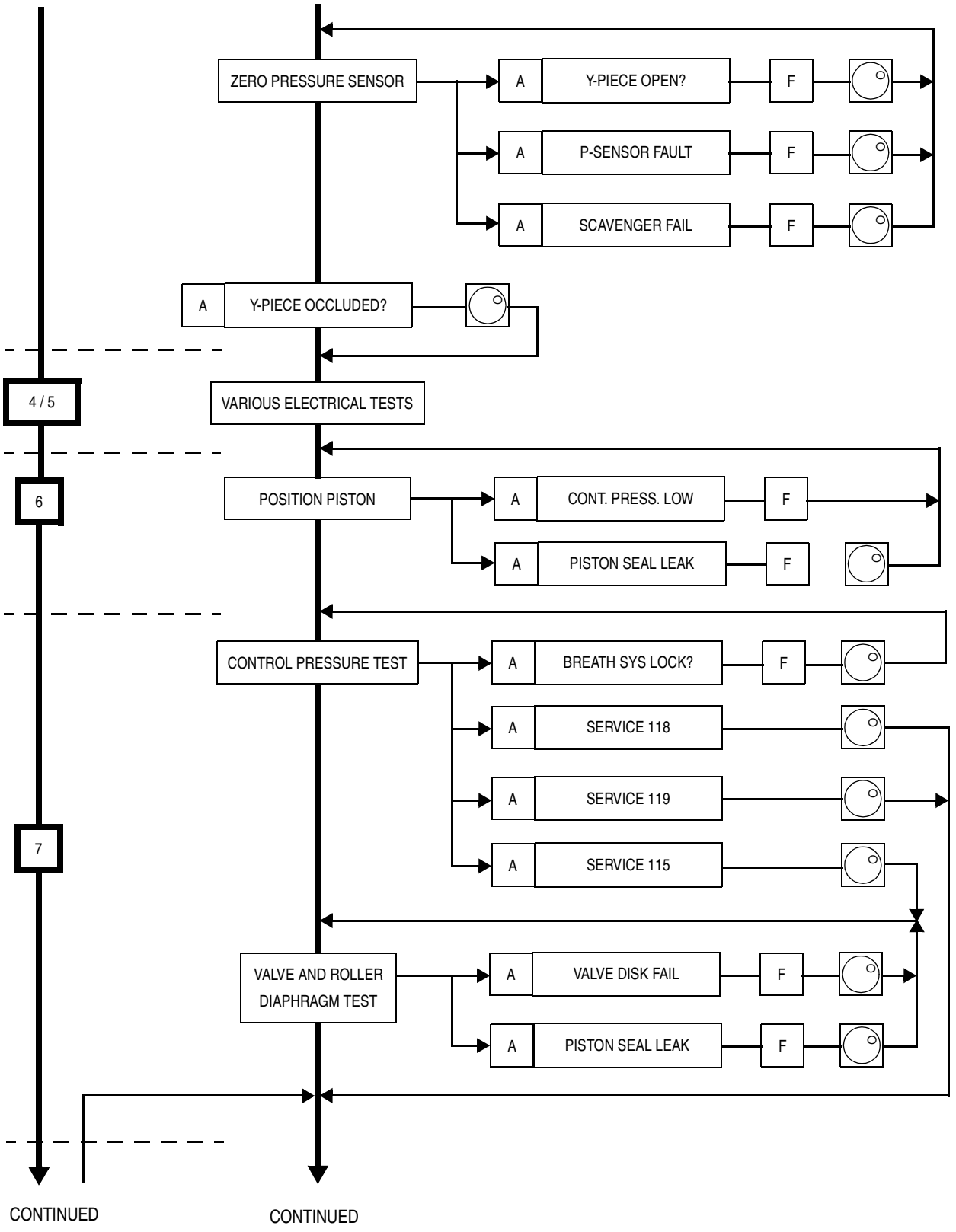
If the machine is shut down and then powered up within four minutes (warm start), the ventilator will skip some of the self tests and proceed to the Standby Mode.

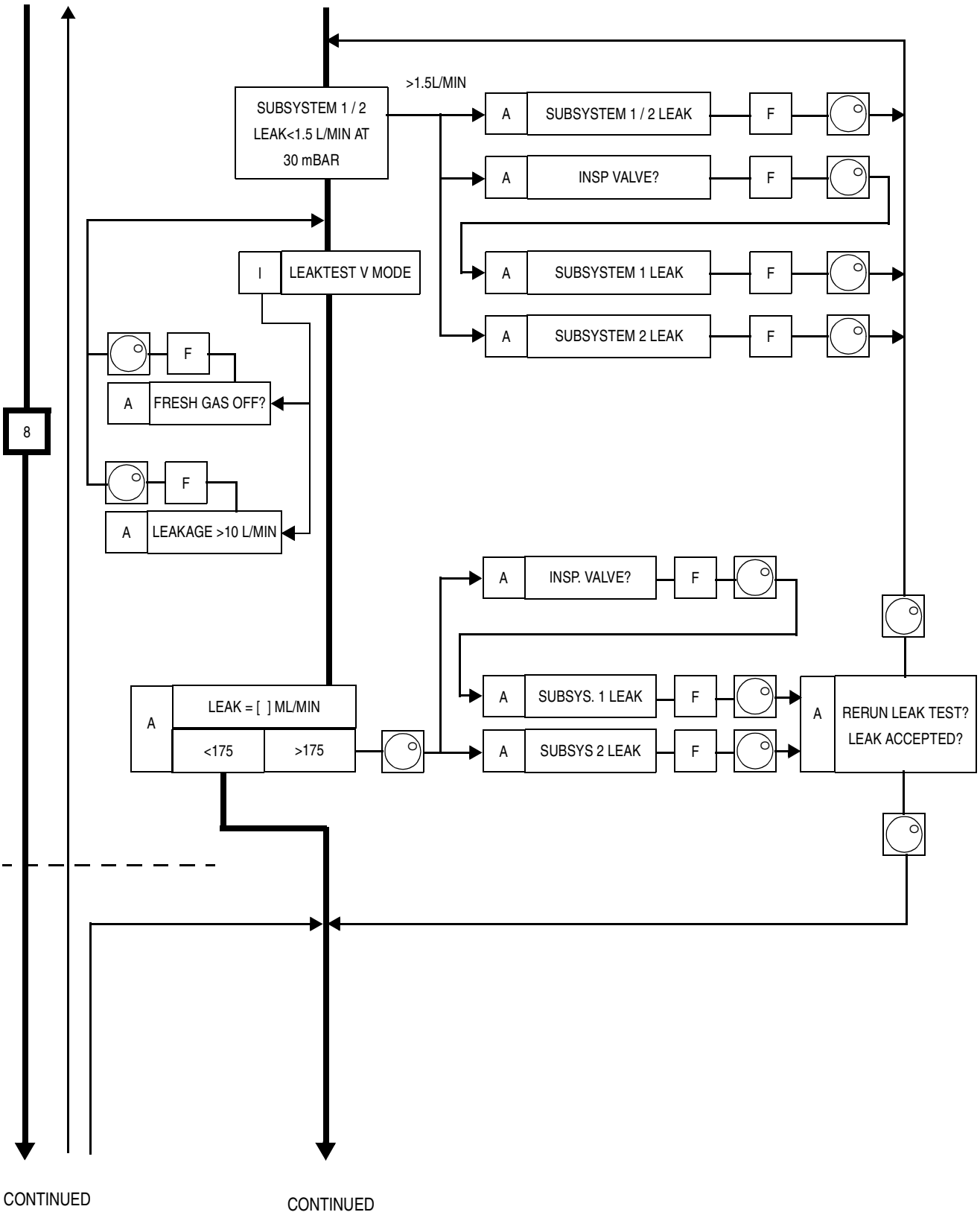
On a cold start, the power-up self test routine can be bypassed if it is desired to proceed with operation immediately. In this case, depending upon where in the sequence the test is interrupted, previously stored values will be substituted for those elements of the test that are skipped.

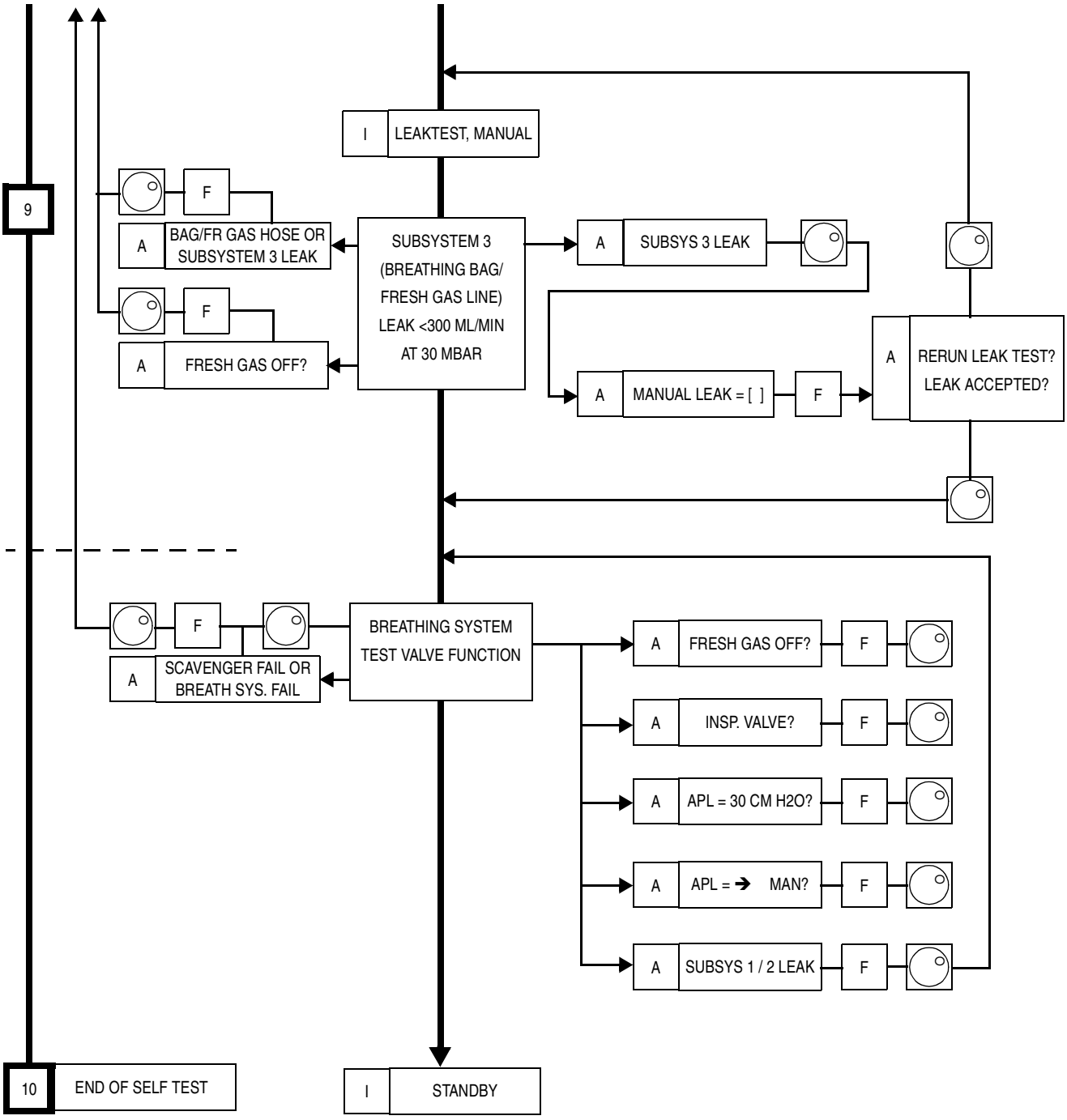
The self test can be bypassed by pressing the Man/Spontaneous or the Volume Mode key. The self test can be bypassed in this manner up to ten consecutive times. When the machine is powered up the next time and allowed to complete its self test, the counter is reset to zero. If a bypass is attempted an 11th time, the display will indicate that the ventilator is in Safe Mode and only manual ventilation is then possible.

The Divan ventilator also has a service mode, described on subsequent pages, that allows you to perform some of these tests manually.


START
SEQUENCE
TEST
1 / 2
I
SELF-TEST
VARIOUS ELECTRICAL TESTS
MAKE CONTACT WITH SYSTEM MONITOR
A
FRESH GAS OFF?
A
APL = 30 CM H2O?
A
Y-PIECE OPEN?
TEST OPERATING CONTROL PRESSURE
A
PISTON SEAL LEAK
F
A
SUPPLY PRESSURE?
F
A
CONT. PRESS. LOW?
F
A
SERVICE 120
3
CHECK PISTON
A
NO PISTON MOTION OR SUBSYSTEM 2 LEAK?
F
A
REMOVE PISTON
A
INSERT PISTON
CONTINUED
CONTINUED
Flow chart of Divan ventilator self test
Legend:
A
Display in dialog window of ventilator
F
Indicated faults must be remedied. Instructions and advisories observed.
I
Information in dialog window of ventilator
Press rotary control
#
Correspondingly numbered test blocks in VT window


ZERO PRESSURE SENSOR
A
Y-PIECE OPEN?
F
A
P-SENSOR FAULT
F
A
SCAVENGER FAIL
F
A
Y-PIECE OCCLUDED?
4 / 5
VARIOUS ELECTRICAL TESTS
6
POSITION PISTON
A
CONT. PRESS. LOW
F
A
PISTON SEAL LEAK
F
CONTROL PRESSURE TEST
A
BREATH SYS LOCK?
F
A
SERVICE 118
A
SERVICE 119
7
A
SERVICE 115
VALVE AND ROLLER
DIAPHRAGM TEST
A
VALVE DISK FAIL
F
A
PISTON SEAL LEAK
F
CONTINUED
CONTINUED


SUBSYSTEM 1 / 2
LEAK<1.5 L/MIN AT
30 mBAR
>1.5L/MIN
A
SUBSYSTEM 1 / 2 LEAK
F
A
INSP VALVE?
F
I
LEAKTEST V MODE
A
SUBSYSTEM 1 LEAK
F
A
SUBSYSTEM 2 LEAK
F
F
A
FRESH GAS OFF?
8
F
A
LEAKAGE >10 L/MIN
A
INSP. VALVE?
F
A
LEAK = [ ] ML/MIN
<175
>175
A
SUBSYS. 1 LEAK
F
A
SUBSYS 2 LEAK
F
A
RERUN LEAK TEST?
LEAK ACCEPTED?
CONTINUED
CONTINUED


9
I
LEAKTEST, MANUAL
F
A
BAG/FR GAS HOSE OR SUBSYSTEM 3 LEAK
SUBSYSTEM 3 (BREATHING BAG/ FRESH GAS LINE) LEAK <300 ML/MIN AT 30 MBAR
A
SUBSYS 3 LEAK
F
A
FRESH GAS OFF?
A
MANUAL LEAK = [ ]
F
A
RERUN LEAK TEST? LEAK ACCEPTED?
F
BREATHING SYSTEM TEST VALVE FUNCTION
A
SCAVENGER FAIL OR BREATH SYS. FAIL
A
FRESH GAS OFF?
F
A
INSP. VALVE?
F
A
APL = 30 CM H2O?
F
A
APL = ➔ MAN?
F
A
SUBSYS 1 / 2 LEAK
F
10
END OF SELF TEST
I
STANDBY

2.9 Divan Service Mode

The service mode allows several ventilator functions to be manually tested as described in the following paragraphs.

To activate the service mode, first turn the System Power switch to STANDBY. Press and hold the hidden keys shown in Figure 2-22. While holding these keys, turn the System Power switch to ON. The Divan display will then indicate SERVICE MODE as shown in the illustration.

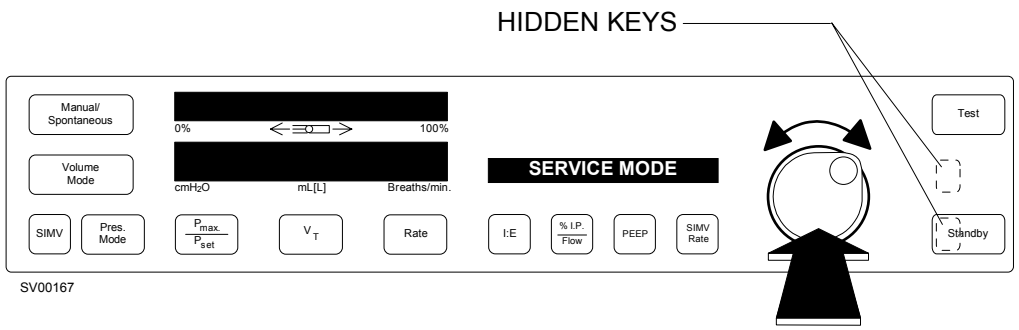


Figure 2-22. Divan Ventilator Control Panel

About the rotary knob:

The rotary knob on the ventilator control panel has two modes:

1. It is used to scroll through the list of tests available in the service menu, in order to make a selection.

2. It is used to scroll within a selected test, when applicable.

You must press the knob to toggle from one mode to the other. There are some exceptions - where the display returns to the service menu automatically at the end of a test. These exceptions are noted where they apply in the following paragraphs.

The tests described in the following paragraphs are listed in the order that they appear in the service menu.

You can exit the Divan Service Mode at any time by turning the Narkomed 6000 System Power switch to STANDBY.

2.9.1 Service Log

With the ventilator in Service Mode, press the rotary knob once and turn the knob until LOGBOOK is displayed as shown in Figure 2-23. Press the knob again to display the log entries.

Turn the rotary knob to scroll through the service log. Each line is displayed in memory address, decimal format and hexadecimal format as shown in the illustration. Turning the knob clockwise scrolls backward in time; turning the knob counter-clockwise scrolls forward to the most recent entry. (The address of the last error entered is 0000.) A list of common error codes is shown in Table 2-1.

NOTE: When an error code is displayed with a decimal number greater than 500, you must subtract 500 from the displayed number to get the correct error code.

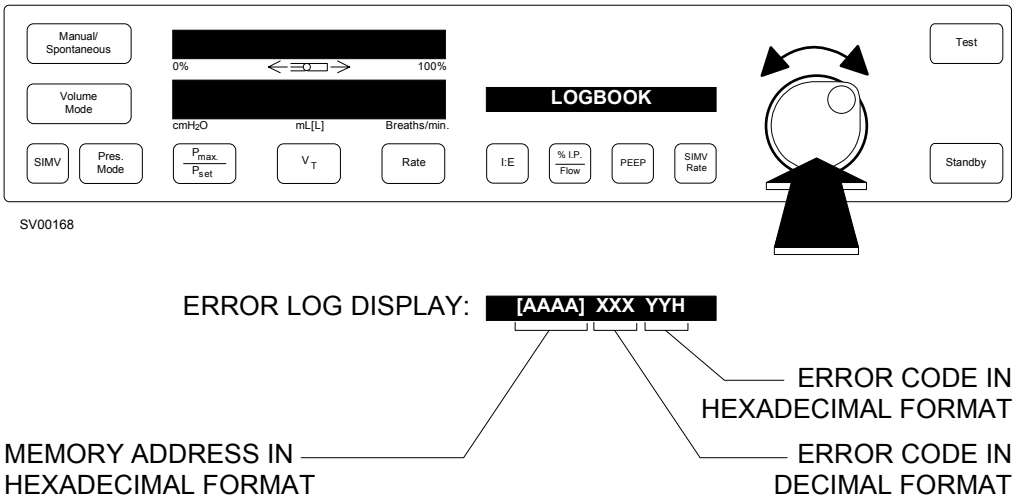


Figure 2-23. Service Log Display

Clearing the error log:

To clear the error log, set the 3rd DIP switch on the ADDA PCB (center board in the electronics compartment below the cover plate) to the DOWN position, and press the Pmax key.

After clearing the error log, return the dip switch to the UP position to allow correct operation of the ventilator.

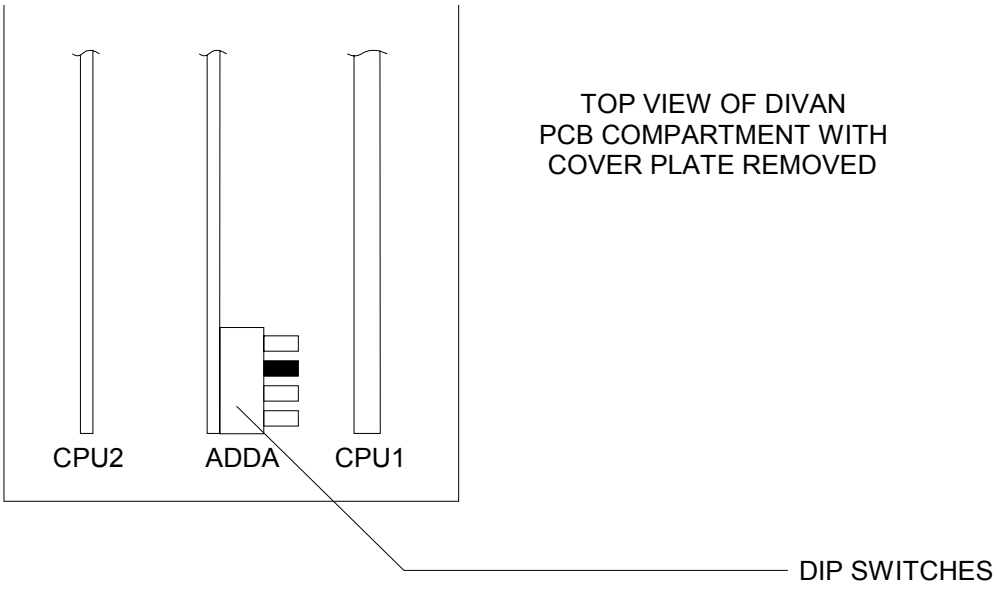


Table 2-1: Divan Error List

Dec	Hex	Fault
001	01	Port module on CPU 2 PCB faulty
002	02	Bar graph or actuation on front panel faulty
003	03	Alphanumeric display, alphanumeric display PCB or front panel PCB faulty
004	04	Key LED faulty
006	06	Front Panel potentiometer faulty
007/008	07	Pressure sensor 1 outside tolerance, value too low with respect to PE2
009/010	09	Pressure sensor 2 outside tolerance, value too low with respect to PE1
012/013	0C	Pressure sensor 3 outside tolerance
014	0E	Release signal not recognized
015	0F	Motor relay not recognized
016	10	Solenoid valve faulty
018	12	Faulty ram on CPU 1
020	14	Faulty RAM on CPU 2
021	15	Faulty RTC on CPU Standard
022	16	Serial interface module on CPU 1
023	17	Serial interface; DCD and/or DTR faulty
024	18	Faulty PEEP valve
027	1B	Incorrect analog values on ADDA PCB
028	1C	Faulty timer on CPU 1
031	1F	Incorrect motor current
032	20	Piston slide not attached to drive belt
033	21	Incorrect motor setpoint
034	22	Setpoint too high with piston positioning
039	27	Mech. stop with piston positioning
043	2B	Incorrect powerfail signals
044	2C	Faulty horn on motherboard.
046	2E	Faulty Fan
049	31	Faulty motor control
050	32	Failure of sync. signal

Table 2-1: Divan Error List

Dec	Hex	Fault
057	39	9V rechargeable battery flat
059	3B	Failure of motor control monitoring
061	3D	Failure of CPU 1 voltage monitoring
062	3E	Fault in ADDA supply voltage
063	3F	Incorrect piston movement
070	46	Incorrect monitoring software
071	47	Unauthorized test termination
084	54	Undefined error
087	57	Excessive motor current
088	58	Excessive deviation
089	59	Failure of supply voltage
090	5A	Incorrect motor actual value
091	5B	Failure of mains supply
094	5E	Port module on ADDA PCB faulty
095	5F	Piston cannot be moved
096	60	Oscillator failure
097	61	Testing of bifurcated light barrier not OK
099	63	Deviation between pressure sensors 1 and 2
100	64	Leak in double roller diaphragm
105	69	Valve V1 cannot be opened
106	6A	Valve V2 cannot be opened
107	6B	Valve V3 cannot be opened
108	6C	V6 cannot be opened or PEEP valve faulty
109	6D	V6 cannot be closed or PEEP valve faulty
111	6F	Faulty ancillary air valve or V2
112	70	Leak in area between MV1 and V1
113	71	Leak in area between MV2 and V2
114	72	Leak in area between MV3 and V3
115	73	Leak in area between MV4 and metering unit

Table 2-1: Divan Error List

Dec	Hex	Fault
117	75	V1, V2, V3 or Y-piece not closed
118	76	Test control pressure outside tolerance
119	77	Test control pressure too high
120	78	Operating control pressure too high
121	79	APL valve faulty
122	7A	Operating control pressure between 40 and 70 mbar
124	7C	Clogged microfilters
125	7E	Unexpected hardware reset
200	C8	Communication problem between CPU 1 and CPU 2
201	C9	CPU 1 - CPU 2 transmission error
202	CA	No monitoring function
203	CB	Failure of CPU 2 horn actuation
204	CC	CPU 2 cannot operate motor driver
205	CD	CPU 2 cannot operate motor relay
206	CE	CPU 2 cannot switch off valves
207	CF	Faulty hardware watchdog on CPU 2
210	D2	No monitoring of analog data on CPU 2
211	D3	Faulty RAM on CPU 2 PCB
212	D4	Faulty EPROM on CPU 2
213	D5	Different system clock between CPU 1 and CPU 2
214	D6	Powerfail signal not plausible (CPU 2)
215	D7	Pressure zero values on CPU 2 outside range
216	D8	CPU 2 signals incorrect piston positioning
217	D9	CPU 2 signals incorrect pressure measurement
218	DA	CPU 2 signals faulty solenoid valve
219	DB	No response to CPU 2 checksum
220	DC	Background cycle time of CPU 2 too long
221	DD	Incorrect calculation of adjustment parameters
222	DE	Incorrect VT input following compliance correction

Table 2-1: Divan Error List

Dec	Hex	Fault
223	DF	Reverse flow measurement outside normal time period
224	E0	Background cycle time of CPU 1 too long
225	E1	Incorrect status of mains switch
246	F6	Invalid mode change
247	F7	Text EPROM cannot be addressed
248	F8	No activation of modules for Timer 2
249	F9	No activation of modules for Timer 1
251	FB	No CPU 1 checksum
252	FC	Incorrect CPU 1 checksum
253	FD	Adjustment data outside valid range
254	FE	Software operation in incorrect sequence
NOTE: When an error code is displayed with a decimal number greater than 500, you must subtract 500 from the displayed number to get the correct error code.		

2.9.2 Removal Position

This function sets the position of the piston so that the piston-cylinder unit can be easily removed from the ventilator. This position may need to be re-established after servicing the piston-cylinder unit or after changing the battery on the CPU board.

Press the knob to display the service menu, and turn it until **removal pos.** is displayed.

Press the knob again to display ADJUST PISTON as shown in Figure 2-24. A bar graph representing the piston position is displayed as shown in the illustration. The correct piston removal position occurs when the left half or less of the bar graph is lighted, and the piston-cylinder unit is easily removed. Several trials may be needed to find the optimum removal position. Turn the knob clockwise to move the piston forward, counter-clockwise to move the piston backward. When the piston is in the correct position, press the knob to store this position for subsequent operation.

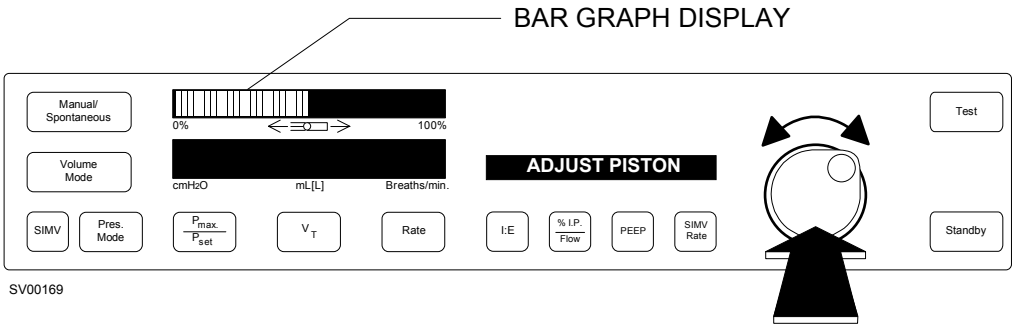


Figure 2-24. Piston Position Display

2.9.3 Language Selection

Press the knob to display the service menu, and turn it until `select lang.` is displayed.

Press the knob again and verify that `US. version xx.xx` is displayed.

Make the correct selection by turning the knob, if needed.

2.9.4 System Selection

Press the knob to display the service menu, and turn it until `select system` is displayed.

Press the knob again and verify that `CICERO EM` is displayed.

Make the correct selection by turning the knob, if needed.

2.9.5 Volume Adjustment

This function sets the minimum tidal volume of the ventilator. It should be set to 10 mL. This value is usually factory set and is stored in memory. If it needs to be changed, the RAM must be removed from CPU2 for 30 seconds to erase the memory.

Press the knob to display the service menu, and turn it until `volume version` is displayed.

Press the knob again and verify that 10 mL is displayed.

2.9.6 Total Hours

This function displays total machine operating hours, and provides a method for changing the displayed hours if needed.

Press the knob to display the service menu, and turn it until total hours is displayed. The display will then appear as shown in Figure 2-25. The hours appear above the Vt and Rate keys.

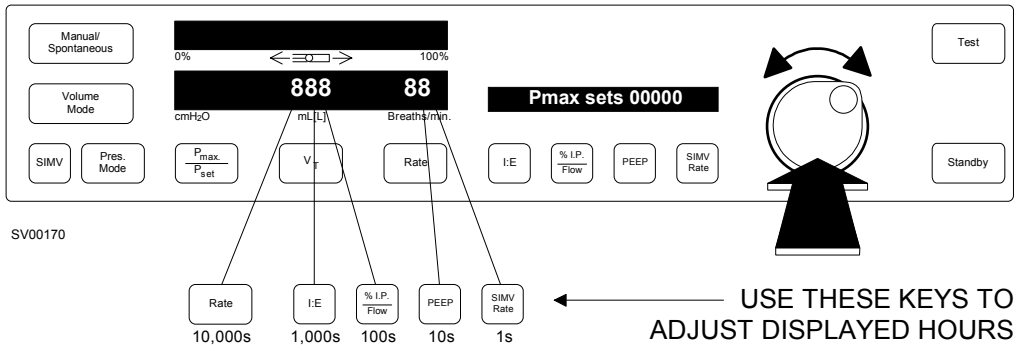
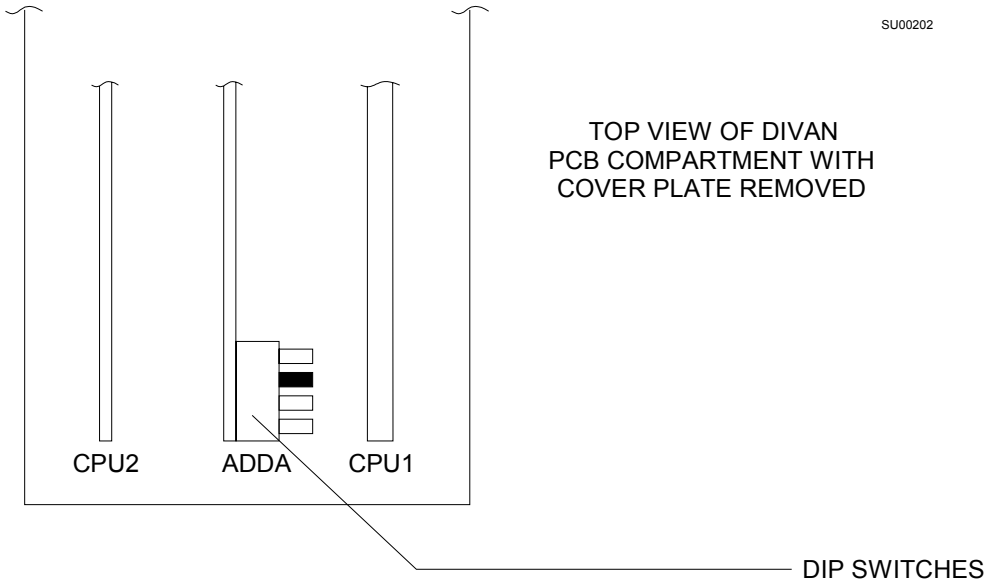


Figure 2-25. Hours Display

To alter the displayed hours:

- Set the 3rd DIP switch on the ADDA PCB (center board in the electronics compartment below the cover plate) to the DOWN position.



- Set the desired display by using the keys shown in the illustration that correspond to the digit(s) you are changing.
- Press the Pmax key to enter the new displayed hours.
- After making the new entry, return the dip switch to the UP position to allow correct operation of the ventilator.

2.9.7 Operating Hours

This function displays the actual hours the ventilator has operated, and does not record time in Standby Mode.

Press the knob to display the service menu, and turn it until operating hours is displayed.

Press the knob again to display the operating hours as shown in Figure 2-25.

The displayed hours can be changed in the same manner as described above for the Total Hours.

2.9.8 Self Test

This test runs the ventilator through a self test cycle similar to the one performed at start-up in the operating mode.

Press the knob to display the service menu, and turn it until self test ? is displayed.

Press the knob again to initiate the self test cycle.

NOTE: At completion of the test, the display automatically returns to the service menu self test ? display. If you press the knob again it will start another self test cycle.

You can cancel out of the test by pressing the STANDBY key on the ventilator control panel.

2.9.9 Volume Mode Leak Test, Vmode (Sub-systems 1 and 2)

This test checks for leakage in the breathing system and hoses, absorber, piston-cylinder unit, inspiration and expiration valves. To perform this test the breathing hoses must be in place and the Y-piece closed.

Press the knob to display the service menu, and turn it until **Leaktest, V mode** is displayed.

Press the knob again to start the test. If the leak test is found to be within acceptable limits, the compliance of the breathing system and hoses in mL/mbar is shown on the Vt display. This reading must be divided by 100 to obtain the actual value in mL/mbar.

Should a leak be detected that would affect the operation of the ventilator, a corresponding message will be displayed. Several possible messages are shown in Figure 2-26.

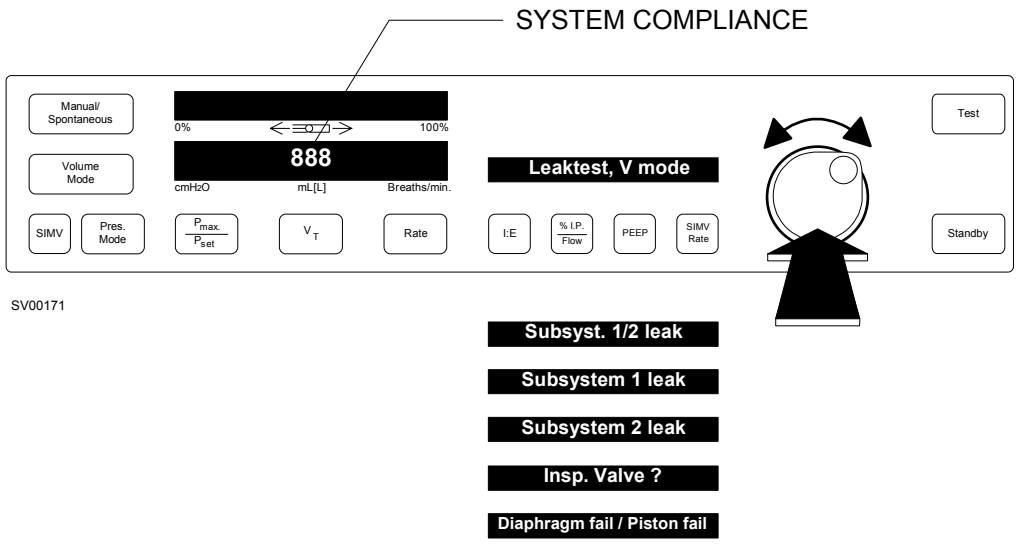


Figure 2-26. V Mode Leak Test Display

2.9.10 Leak Test, Manual (Sub-systems 1, 2 and 3)

In addition to parts of the system checked in the previous test, this test includes the bag hose and bag, fresh gas hose, flow meters, ORC and vaporizer mounts.

Press the knob to display the service menu, and turn it until **Leaktest, manual** is displayed.

Press the knob again to start the test. At completion of the test, the sub-systems leak rate is displayed in mL/min. as shown in Figure 2-27.

During this test the display may ask for confirmation of a leak location. You will then need to correct the problem, and then press the knob to continue.

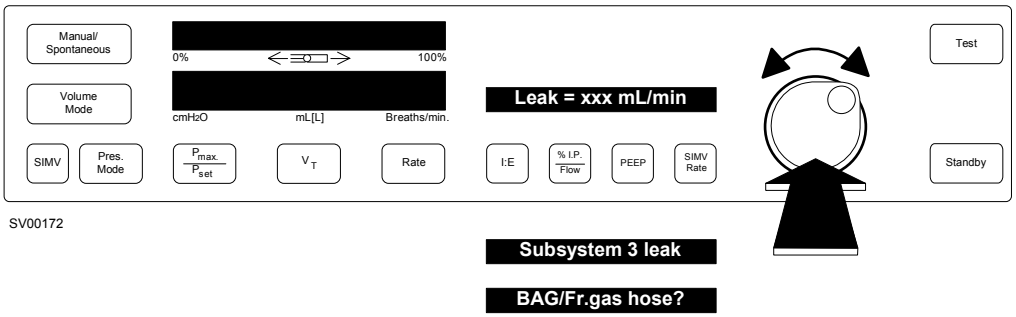


Figure 2-27. Leak Test Manual Display

2.9.11 Valve Test

This function allows manual operation of the solenoid valves in the ventilator and is useful for checking control pressure at the pneumatic interfaces.

Press the knob to display the service menu, and turn it until conf. valves is displayed.

Press the knob again to display control pressure and valve status as shown in Figure 2-28.

The left portion of the display indicates the control pressure. Three digits are displayed; the reading must be divided by 10 for the actual pressure.

The right portion of the display (six digits) indicates the state of the six solenoid valves, where 0 = off, 1 = on. A schematic diagram of the pneumatic control system is shown in Figure 2-29. In the valve test mode, the solenoid valves are operated by the keys on the ventilator control panel, as noted in the following table.

Control Key	Valve Desig.	What it controls	Measure press. at
Pmax	MY1	Fresh gas valve	Breathing sys interface V1
Vt	MY3	APL valve	Breathing sys interface V3
Rate	MY4		
I:E	MY9	Piston seal	Piston interface C1
%I.P.	MY2	Air inlet valve	Breathing sys interface V2
PEEP	MY8	O2 supply to ventilator	

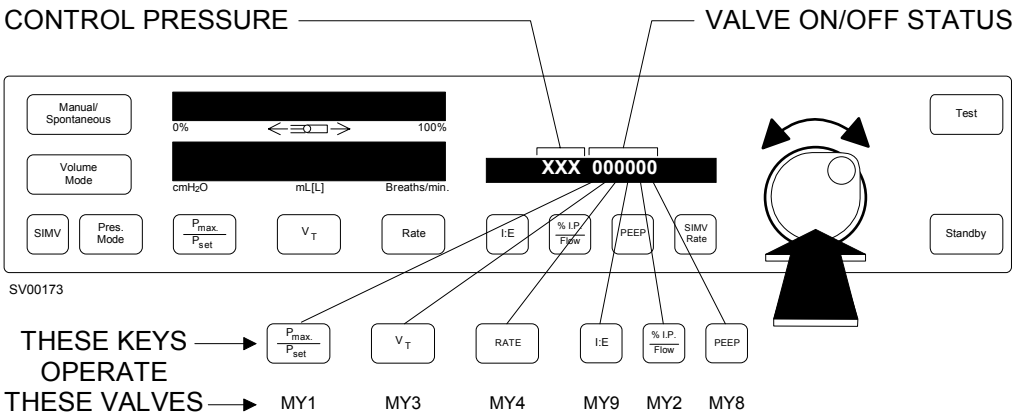


Figure 2-28. Manual Solenoid Valve Control

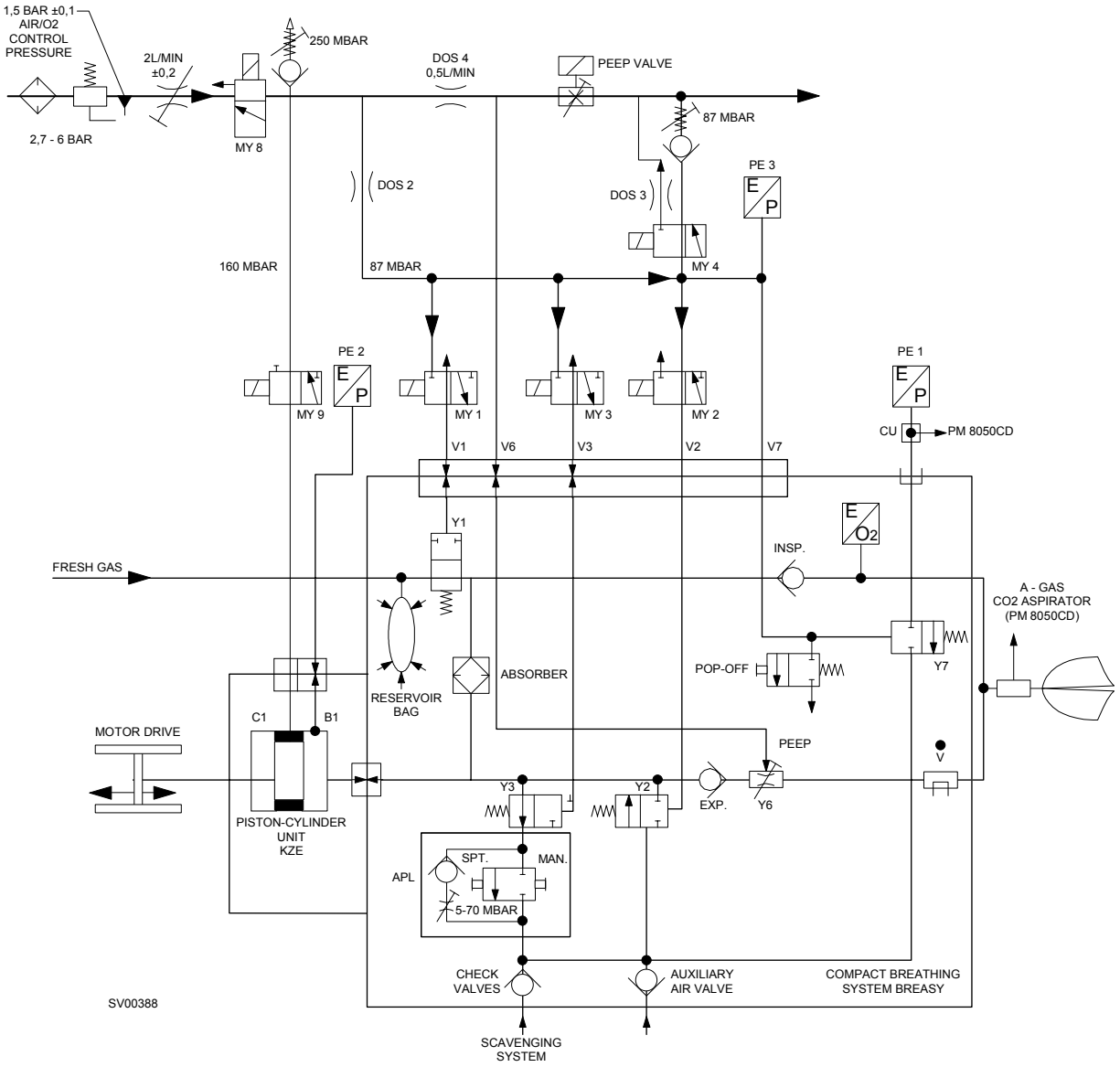


Figure 2-29. Schematic Diagram of Divan Pneumatic Control System

2.9.12 Display of Pressure Values

This function displays the pressure values measured by the sensors in the ventilator for airway pressure, piston pressure and control pressure.

Press the knob to display the service menu, and turn it until **disp. press. Val** is displayed.

Press the knob again to display the pressure values as shown in Figure 2-30.

The displayed readings must be divided by 10 for the actual pressure in mbar.

System compliance is also shown in the Vt display. This reading must be divided by 100 to obtain the actual value in mL/mbar.

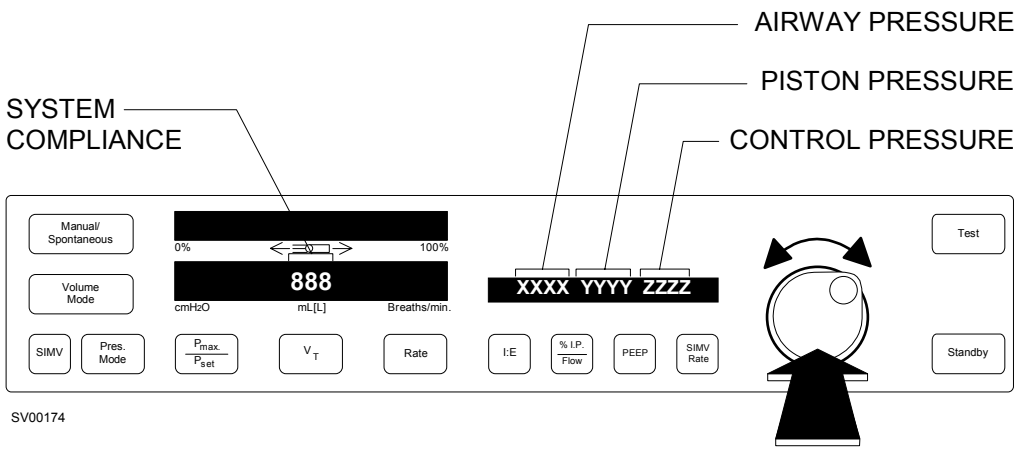


Figure 2-30. Pressure Value Display

2.9.13 Pressure Sensor Calibration

This function calibrates pressure sensors PE1, PE2 and PE3.

Press the knob to display the service menu, and turn it until `calib. sensors ?` is displayed.

Press the knob again to perform the calibration.

`sensors calib !` will be displayed for a second.

NOTE: Following the sensors calib! message, the display will automatically return to the service menu.

2.9.14 Hardware I/O

Press the knob to display the service menu, and turn it until `Hardware I/O` is displayed.

Data at the parallel ports of the ADDA PCB is displayed. Turning the knob will scroll through the addresses listed, and the corresponding errors.

2.9.15 Moving the Piston

Press the knob to display the service menu, and turn it until `move piston` is displayed.

Press the knob again; turn the knob in each direction to test piston movement.

The display above the Pmax key indicates the pressure at Sensor PE1.

The display above the Vt key shows motor current while the piston is moving.

The alphanumeric display indicates piston position in hexadecimal format `Targ XXX Act YYY` , where XXX is the target value and YYY is the actual value.

2.9.16 A/D Converter

This function is used to check pressure sensor zero calibration during the PMS Procedure given in Section 6. It is also has other diagnostic functions, with acceptable ranges listed in the Divan documentation.

Press the knob to display the service menu, and turn it until A/D converter is displayed.

Press the knob again to display the hex values of the 2-bit A/D converter on the ADDA PCB. Turn the knob to scroll through channels 0 thru F.

2.9.17 PEEP Valve

This test allows verification of PEEP valve operation by displaying the pressure setpoint vs. control current.

Press the knob to display the service menu, and turn it until PEEP Valve is displayed.

Press the knob again to display Targ XX Act YY , and turn the knob to set a pressure on the PEEP valve.

The values displayed at XX represent the PEEP pressure setpoint in mbar. The number shown at YY is proportional to the control current operating the PEEP valve. This number is scaled so that it should be within one digit of the setpoint over the entire range.

2.9.18 RS232 Tests

RS232 Test Man. and RS232 Test Auto are serial interface tests intended for use with a Drägerwerk monitor and do not apply to the NM6000.

2.9.19 PC Service Mode

This function allows access to the service mode through an external PC or service laptop. Because of the slow interface, the use of this function is not recommended.

2.9.20 Select Parameter

This function is used to set the default values for the ventilation parameters. It is recommended that these settings not be changed in the field.

2.9.21 Display Configuration

This function allows the Divan self test display to be set on or off.

Press the knob to display the service menu, and turn it until display config. is displayed.

Press the knob again and verify that display on is shown. This is the correct setting.

2.9.22 Standby Setting

This function sets the length of time the STANDBY key has to be held to put the Divan into standby.

Press the knob to display the service menu, and turn it until standby variant is displayed.

Press the knob again and verify that T = 2 Sec. is shown. This is the correct setting.

2.9.23 Confirm Mode

The ventilator is designed with two different modes of confirming certain changes in operating modes.

This function allows the confirmation method to be selected.

Only “Confirm R-knob” (not “Confirm Time”) is acceptable for use on the Narkomed 6000.

2.9.24 Cancel Tests

This function sets the number of Power-up self tests that may be by-passed. Only “Limited” is acceptable for use on the Narkomed 6000.

RETURN TO THIS MANUAL'S TABLE OF CONTENTS
RETURN TO CD-ROM TABLE OF CONTENTS

3.0 TROUBLESHOOTING

This section contains information to assist the Draeger Medical, Inc. qualified Technical Service Representative (TSR) in locating electrical faults affecting the Narkomed 6000 anesthesia system. Some pneumatic fault locating information is also included in this section. Most troubleshooting efforts begin with verifying power supply voltages. The following paragraph summarizes the voltage distribution scheme within the machine.

3.1 Power Supply and Voltage Distribution

Test points, voltages and their allowable ranges for the Narkomed 6000 system and Divan ventilator are given in Table 3-1. System voltage is distributed to the CRT, flowmeter lights and table lamp. Voltage for the VPO assembly and the gas analyzer pod is supplied via the communication port assembly. A block diagram of the voltage distribution arrangement is shown in Figure 3-1. Connector locations are shown in Figure 3-2.

NOTE: If the Vitalbus Hub door on the back of the machine is opened for test purposes, be sure to reinstall the power cord as shown in Figure 3-4 when the machine is placed back in service.

Table 3-1:

PROCESSOR	VOLTAGE	ACCEPTABLE RANGE
J1-3	+48 VDC	40 to 56 VDC
J1-1	Return	
COMM PORT ASM	VOLTAGE	ACCEPTABLE RANGE
J3-2	+15.5 VDC	14.73 to 16.23 VDC
J3-6	Return	
SYSTEM	VOLTAGE	ACCEPTABLE RANGE
J6-14	+24.5 VDC	23.23 to 25.73 VDC
J6-3	Return	
VENTILATOR	VOLTAGE	ACCEPTABLE RANGE
J2-2	+24.5 VDC	23.23 to 25.73 VDC
J2-14	Return	
J2-1	+5.1 VDC	4.95 to 5.25 VDC
J2-16	Return	
J2-6	+15 VDC	14.55 to 15.45 VDC
J2-13	Return	
J2-7	-15 VDC	-14.55 to -15.45 VDC
J2-4	Return	

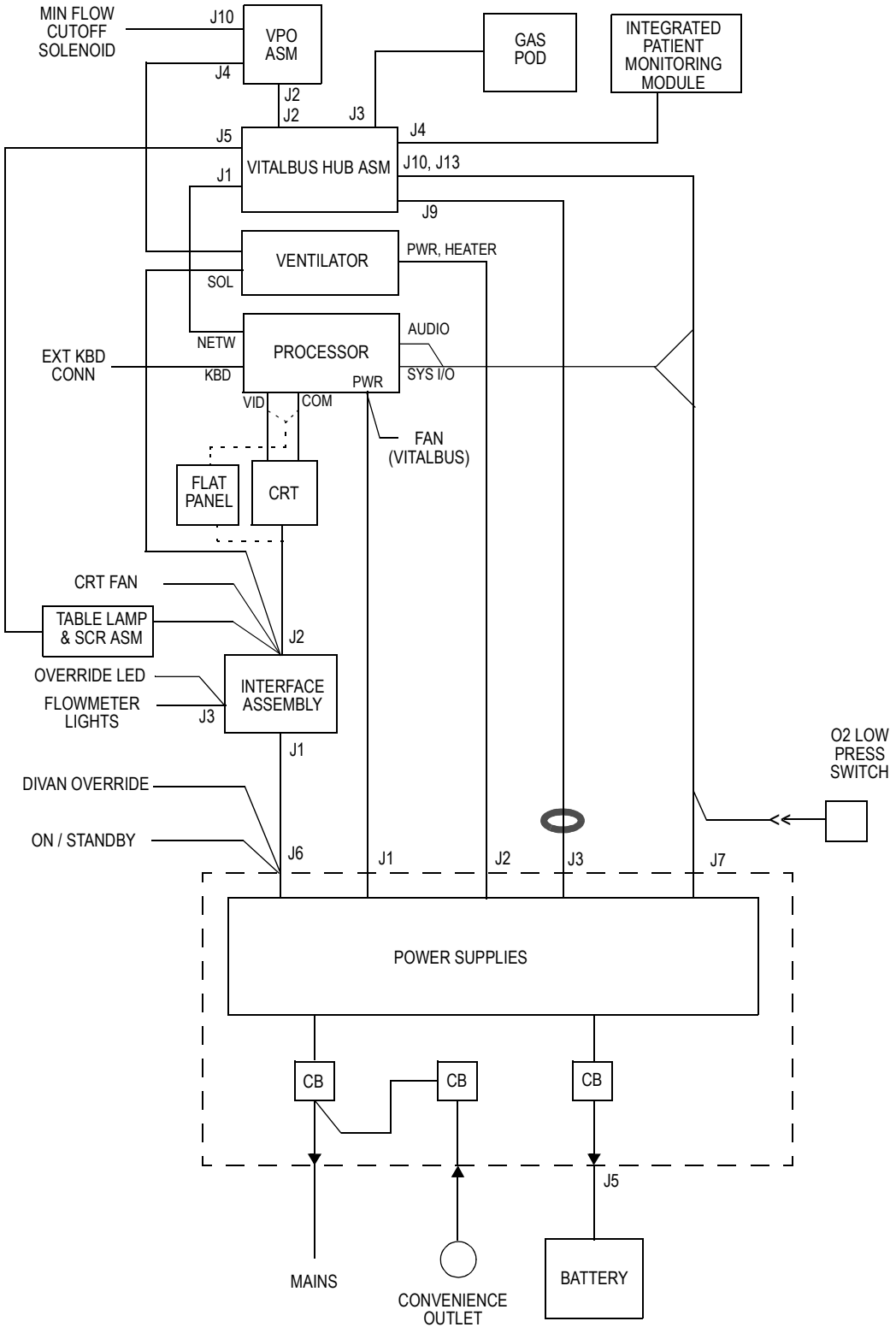


FIGURE 3-1. Narkomed 6000 Block Diagram (Electrical)

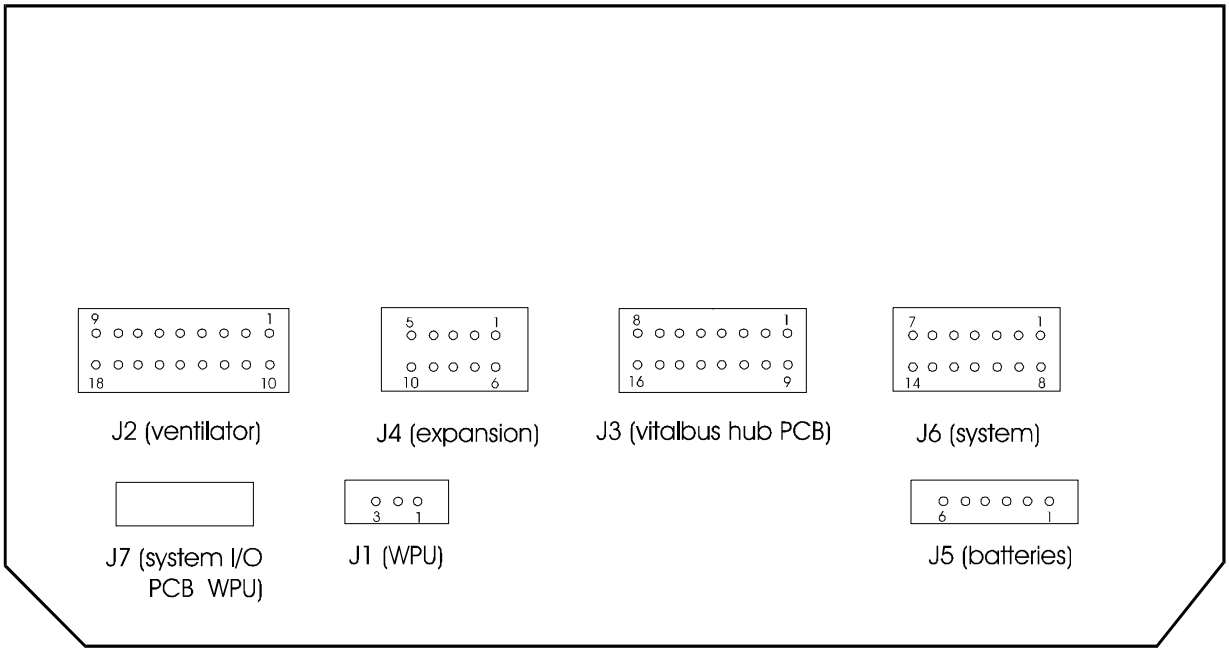
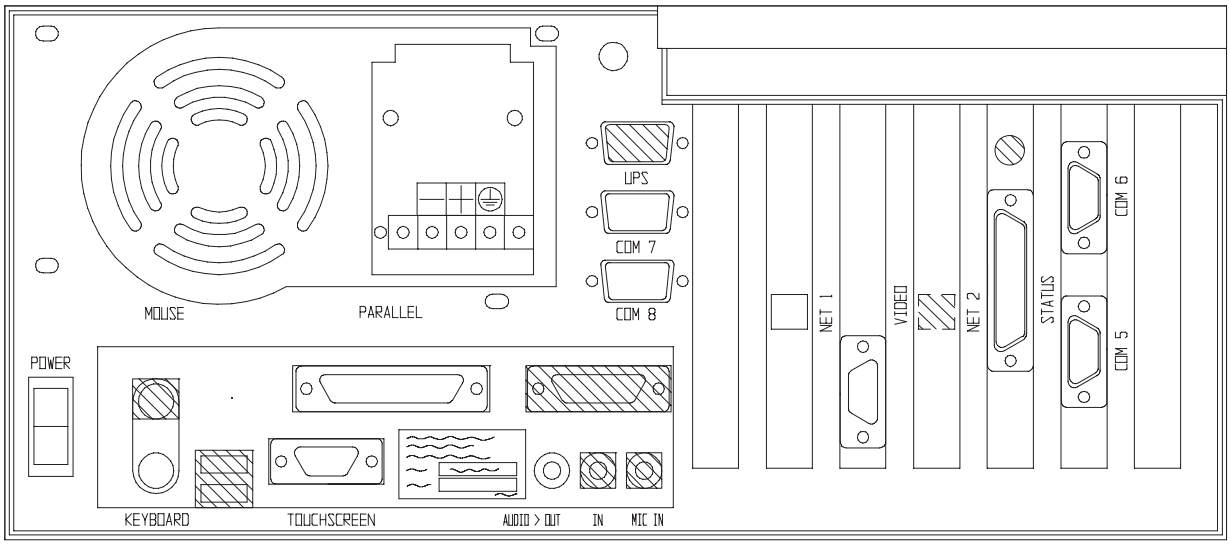


FIGURE 3-2. Power supply connector locations on floor of machine (rear view)

EARLY DESIGN FOUR COM PORT



SV00394

LATER DESIGN SINGLE COM PORT

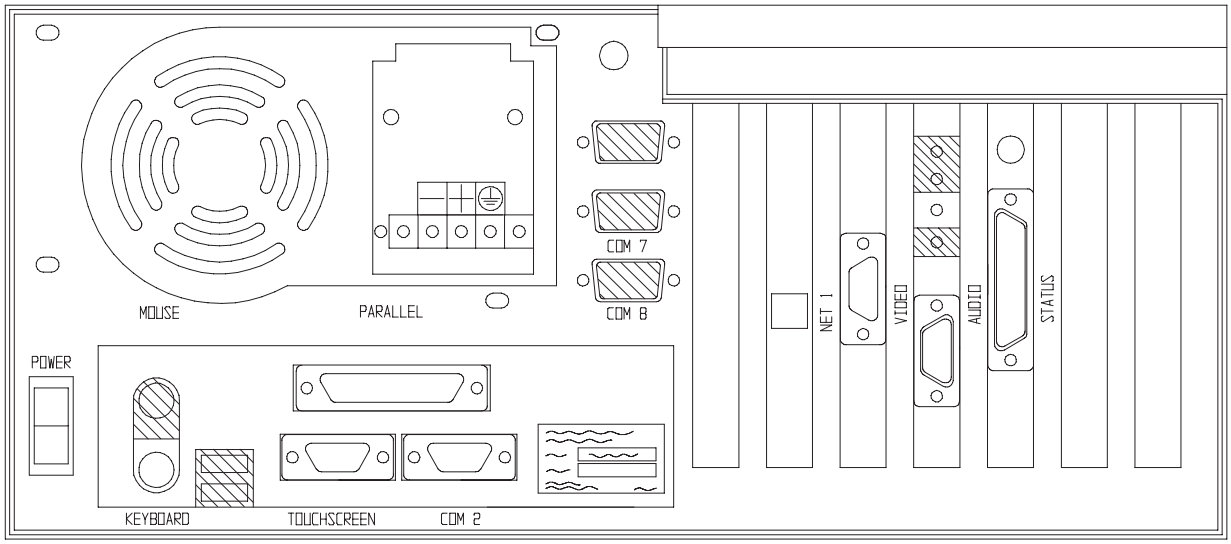


FIGURE 3-3. WPU (Processor) Connector Labeling

denotes connectors not used.

3.2 Battery

The battery bank comprises four 12-volt storage batteries connected in series for a nominal backup supply of 48 V. The battery voltage is monitored by the system, and a 'battery low' signal is generated if the battery voltage drops below 46.8 V (±0.5V). Battery disconnect occurs when voltage drops below 40.0 V (±0.5V). Battery voltage can be measured at its power supply connector, J5-6 (+) to J5-1 (-).

Power Cord Routing:

If the Vitalbus Hub door on the back of the machine is opened for test purposes, be sure to reinstall the power cord as shown in Figure 3-4 when the machine is placed back in service.

Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole dirrectly above the power cord socket as illustrated.

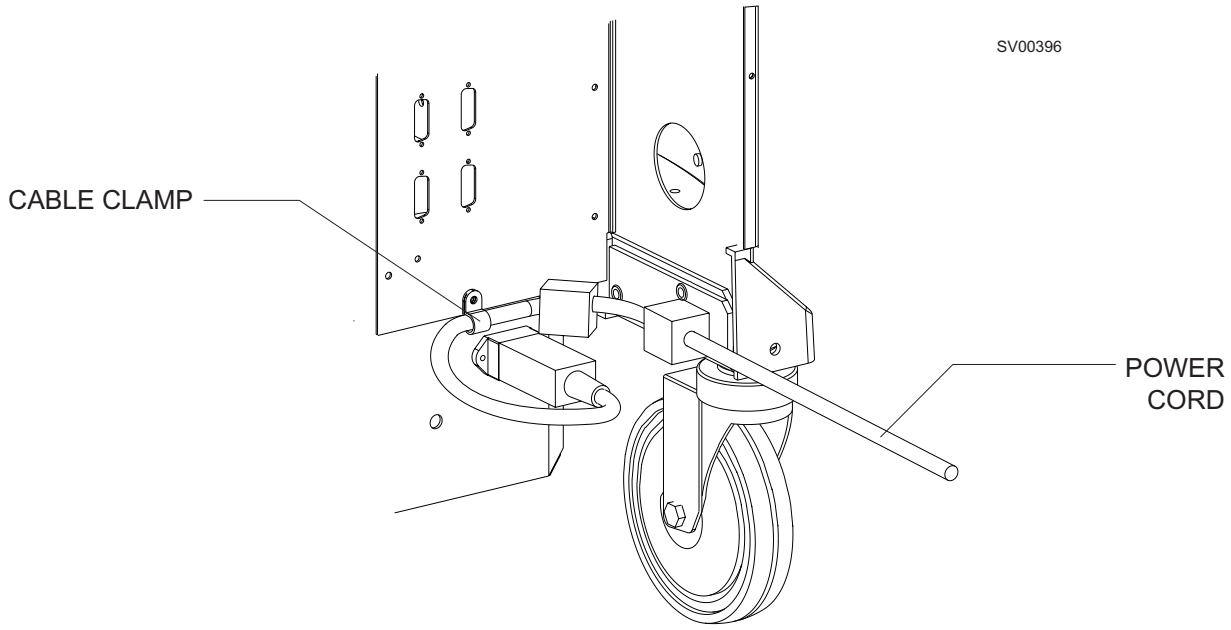


FIGURE 3-4. Power Cord Routing

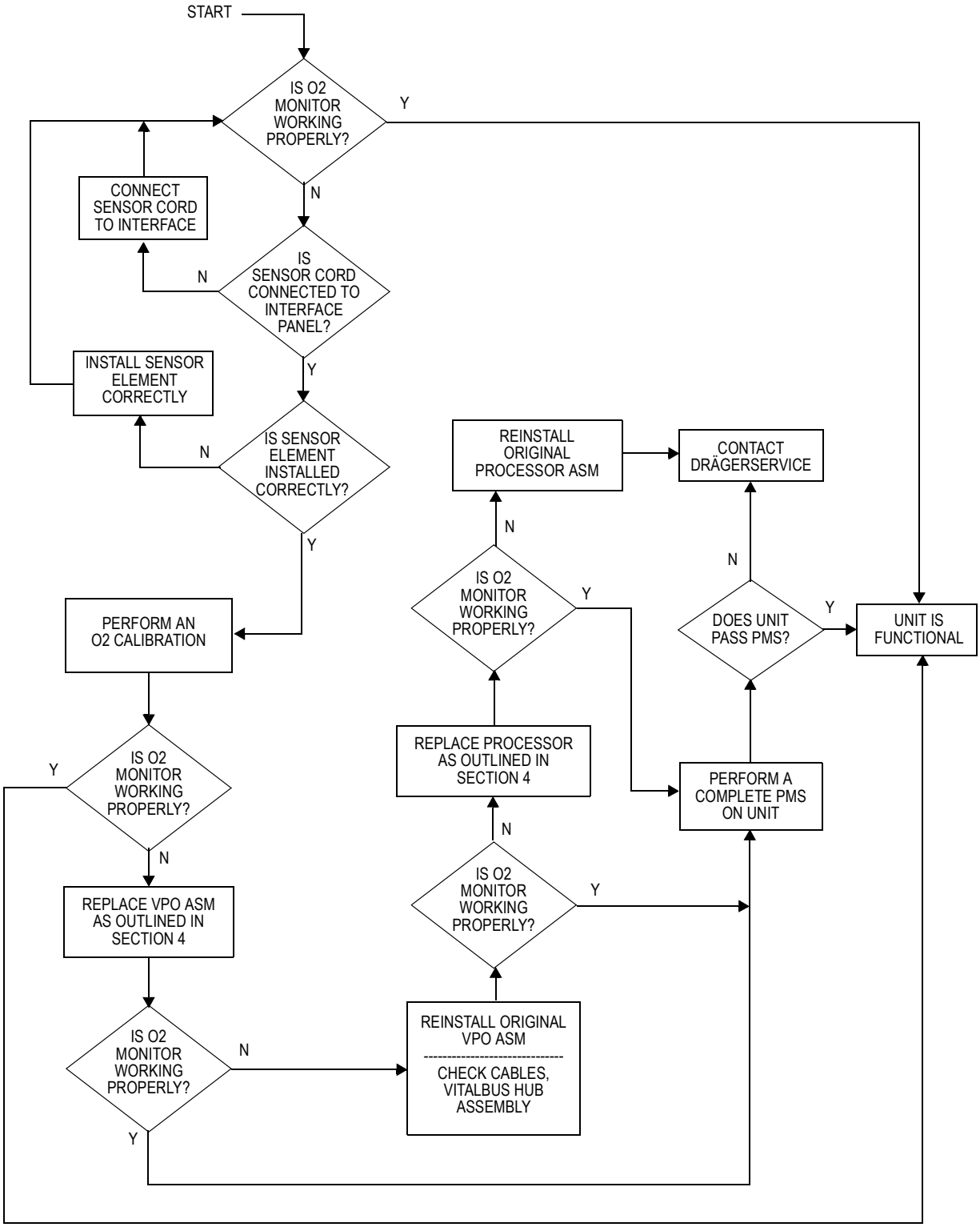
3.3 Troubleshooting Guides

Table 3-2 lists common failure modes and symptoms (excluding simultaneous multiple faults) for the monitoring and display devices, and several ventilator functions. Each failure mode or symptom is keyed to a troubleshooting guide flow chart at the back of this section to assist the TSR in locating a problem. These guides assume that the machine is plugged into an AC outlet with the correct voltage, and the machine is not running on its backup battery.

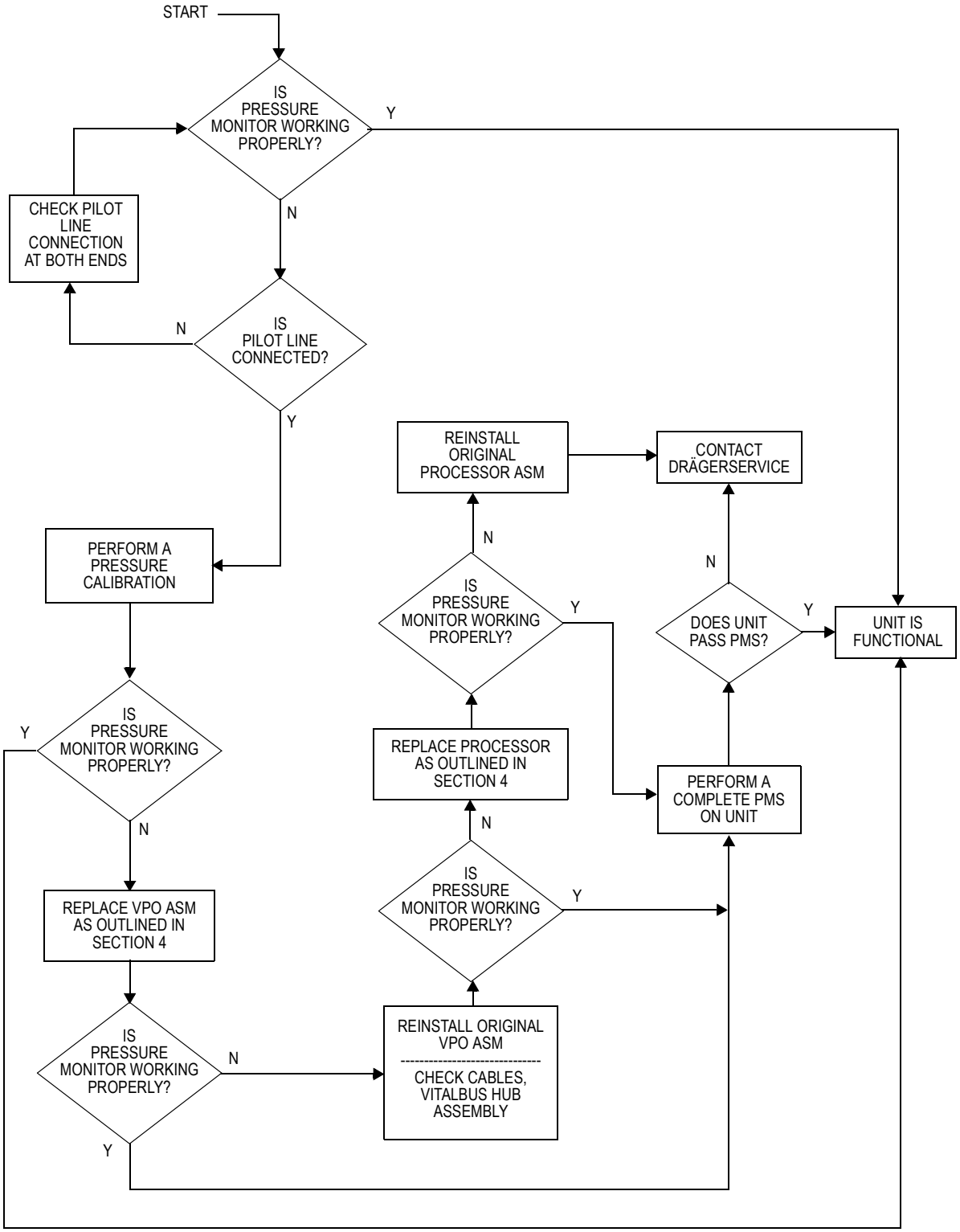
Table 3-2: Narkomed 6000 Failure Mode and Symptom List

FAILURE MODE / SYMPTOM	CORRECTIVE ACTION
Loss of O2 Monitor	Guide 1
Loss of Breathing Pressure Monitor	Guide 2
Loss of Respiratory Monitor	Guide 3
Loss of Agent Monitor	Guide 4
No Audio Alarms	Guide 5
Serial Port Communication Failure	Guide 6
No Oxygen Supply Pressure Alarms	Guide 7
CRT Blank	Guide 8
Touch Screen Not Responding	Guide 9
Ventilator Piston-Cylinder Not Working	Guide 10
Leak Test Failure at Ventilator Start-Up	Guide 11
Vapor Exclusion System Sticking	Guide 12
Can't Remove Ventilator Piston-Cylinder Unit	Guide 13
Humming noise from Divan during mechanical ventilation	Guide 14

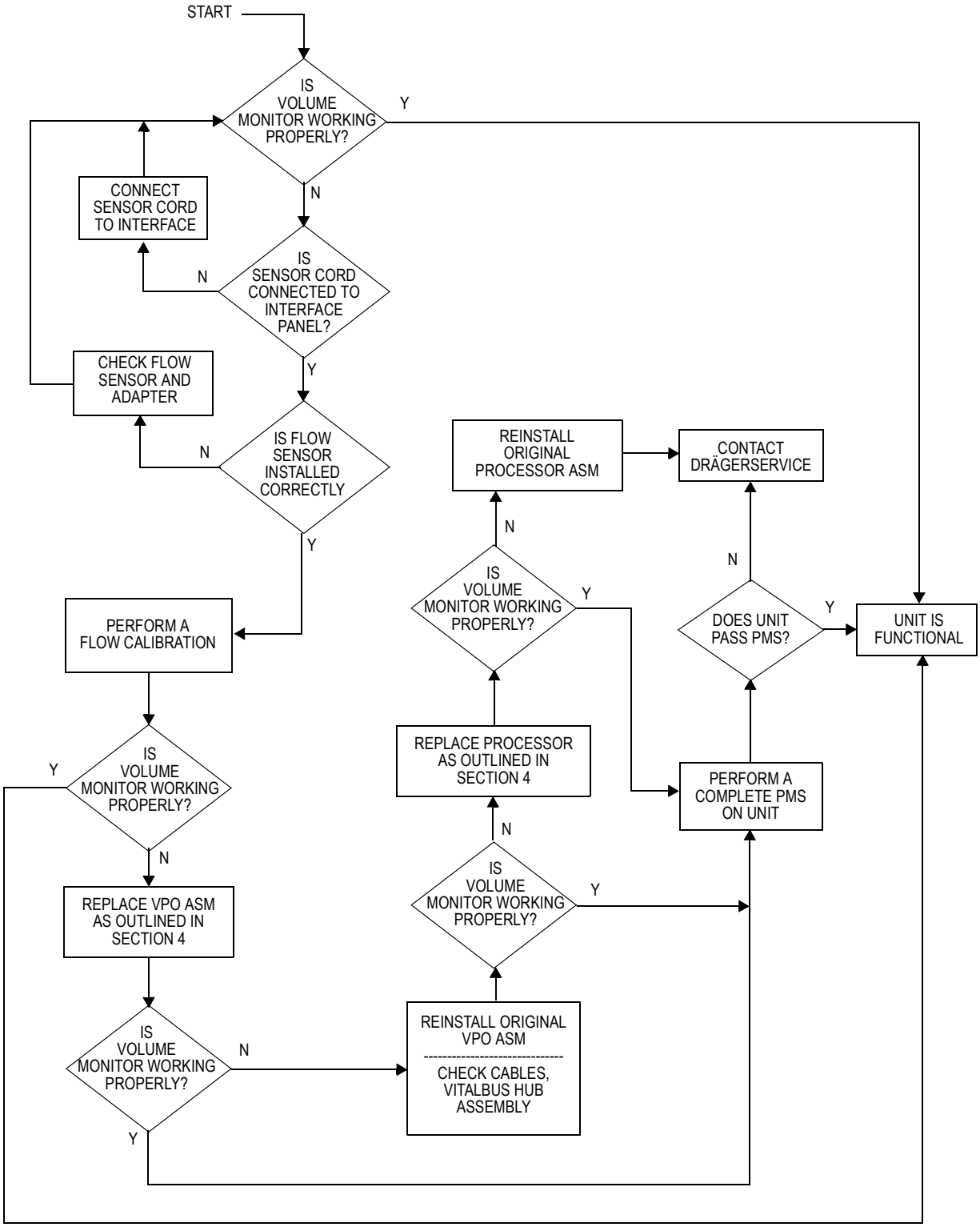
Guide 1: Loss of O2 Monitor



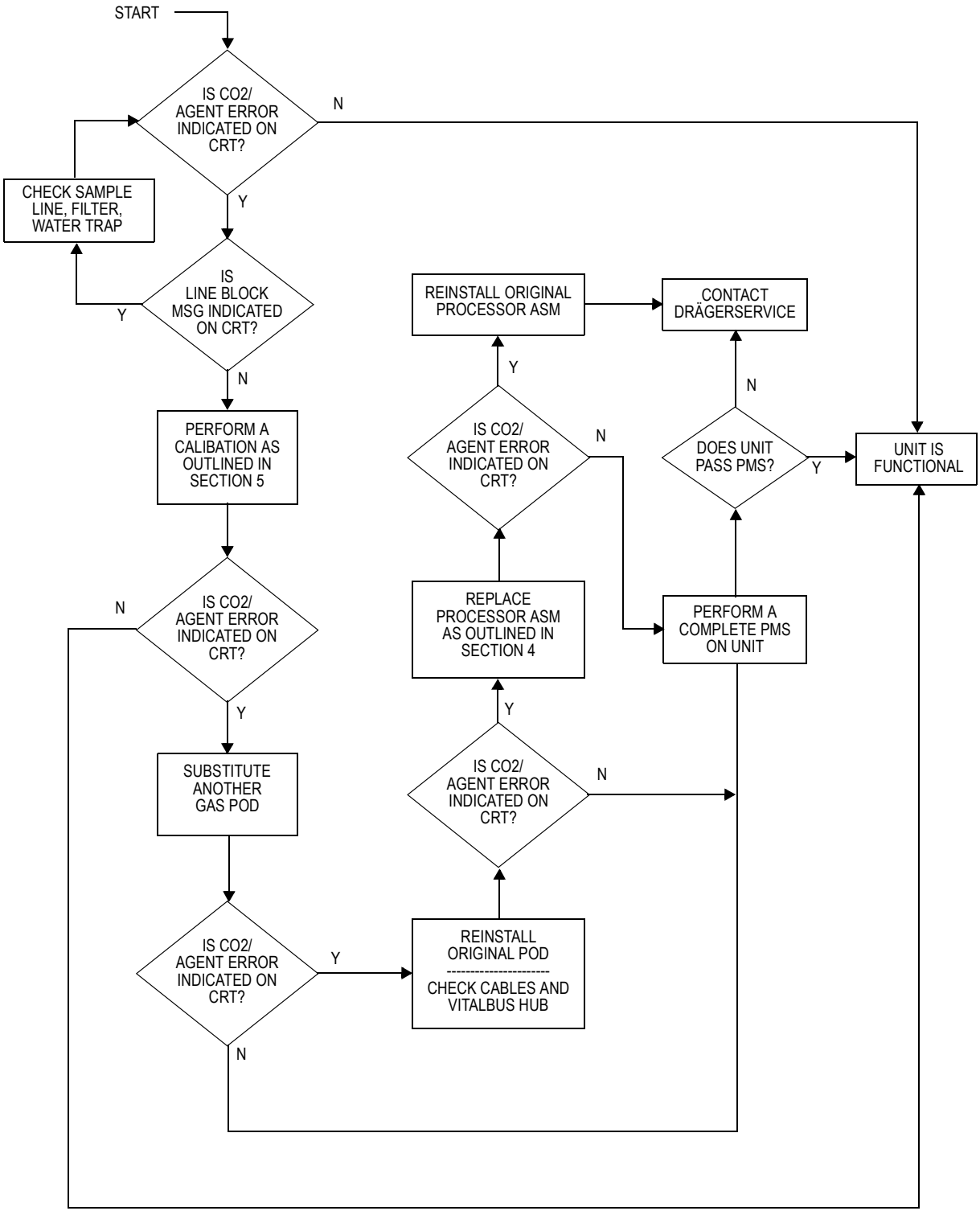
Guide 2: Loss of Breathing Pressure Monitor



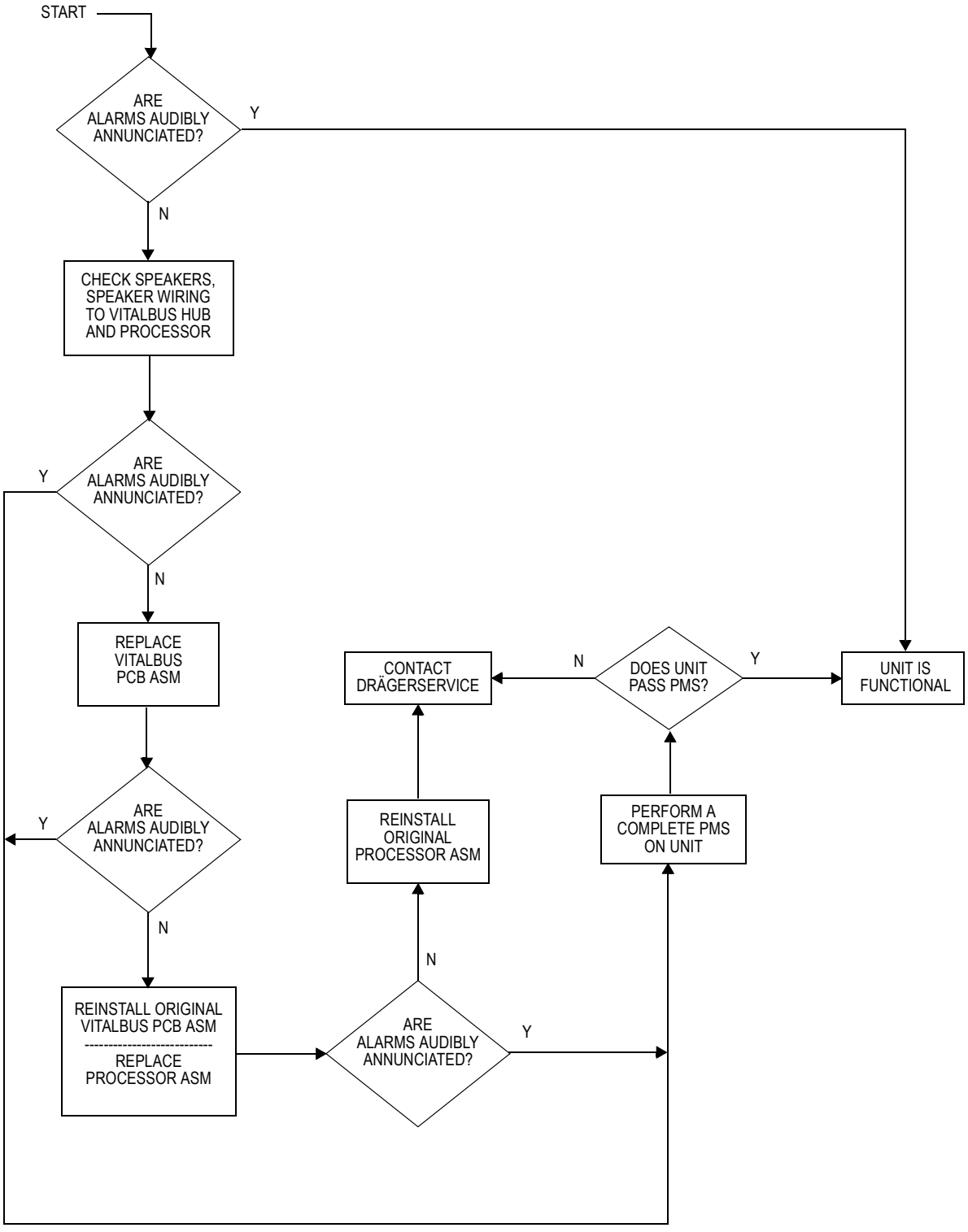
Guide 3: Loss of Respiratory Volume Monitor



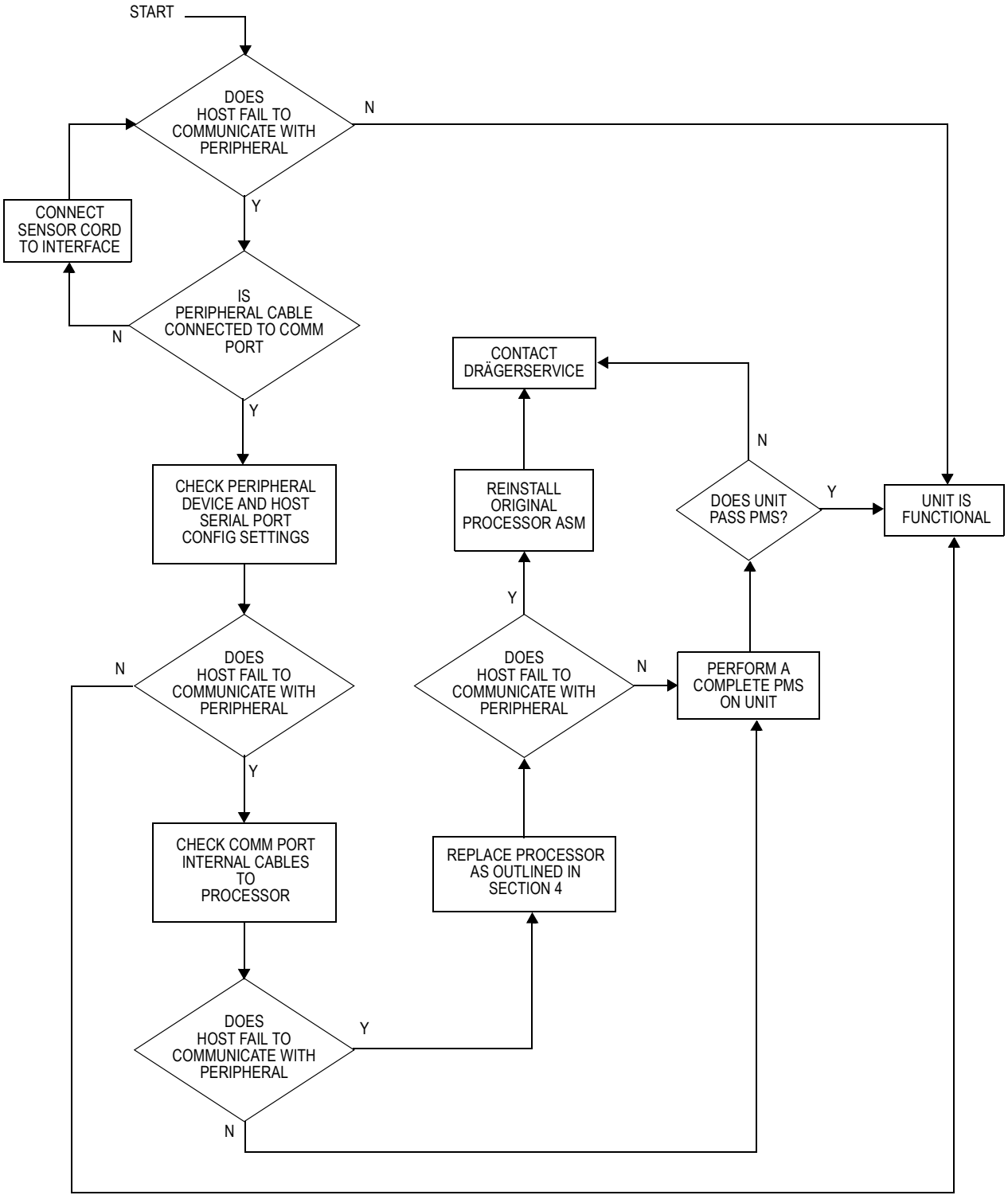
Guide 4: Loss of Agent Monitor



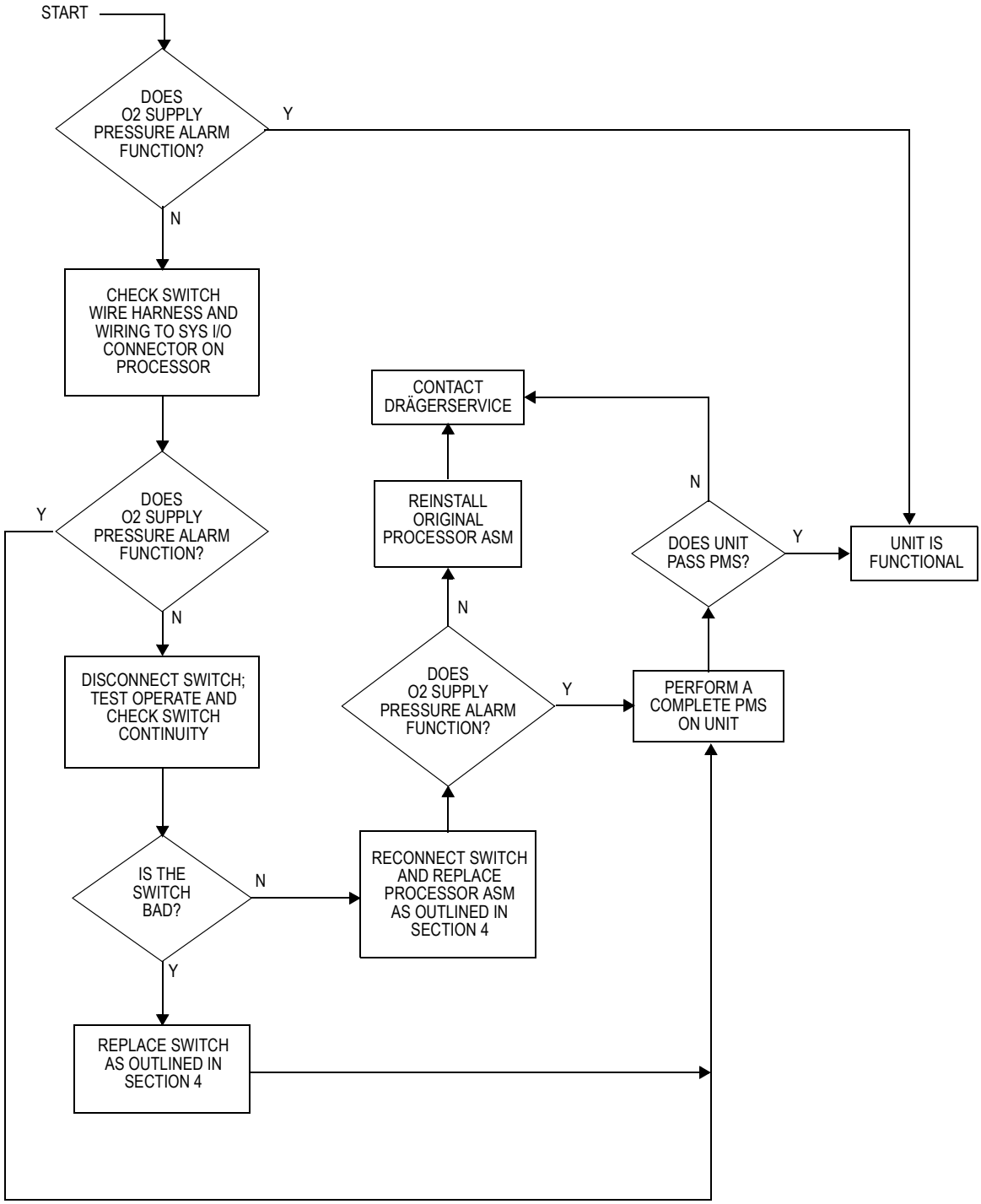
Guide 5: No Audio Alarms



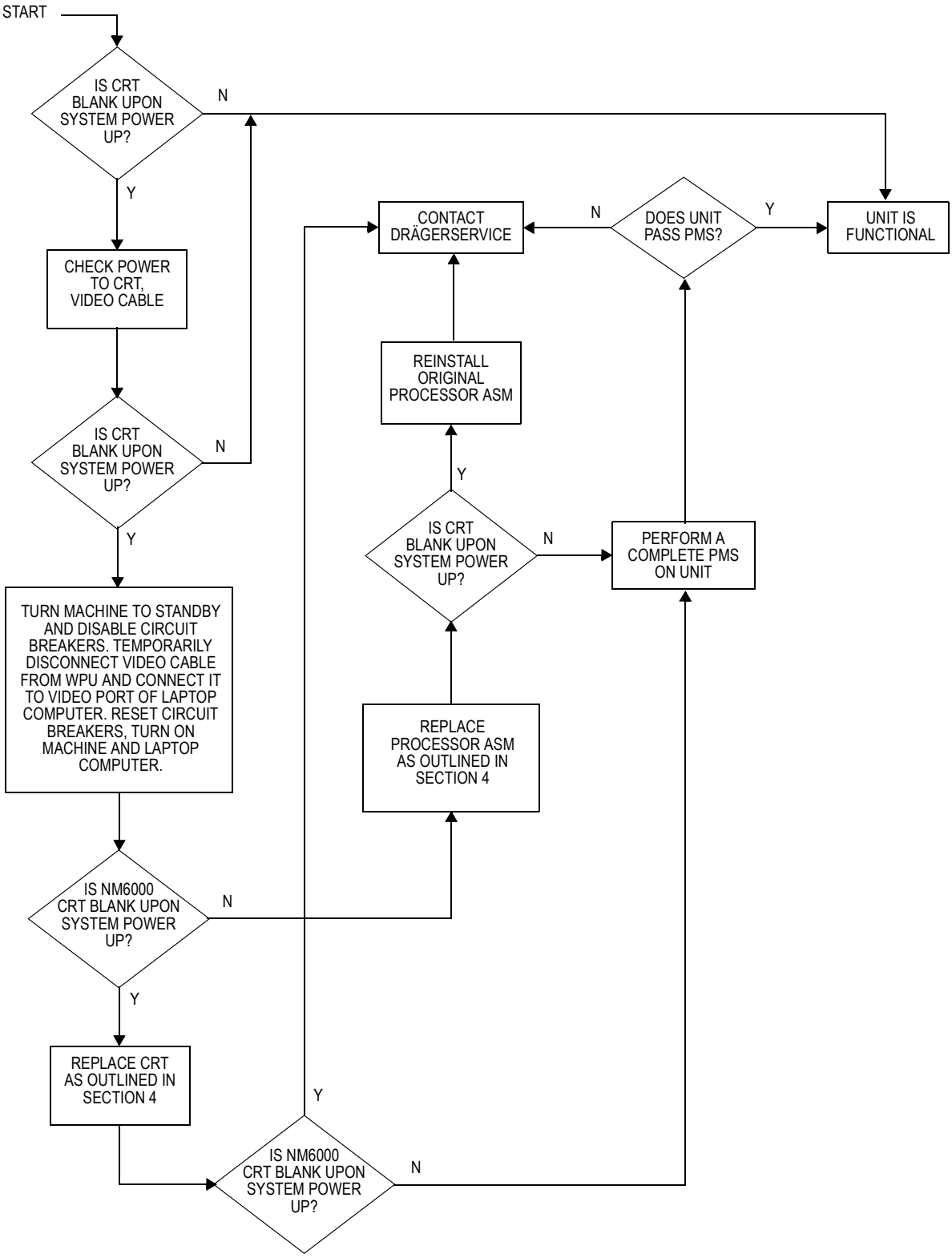
Guide 6: Communication Port Failure



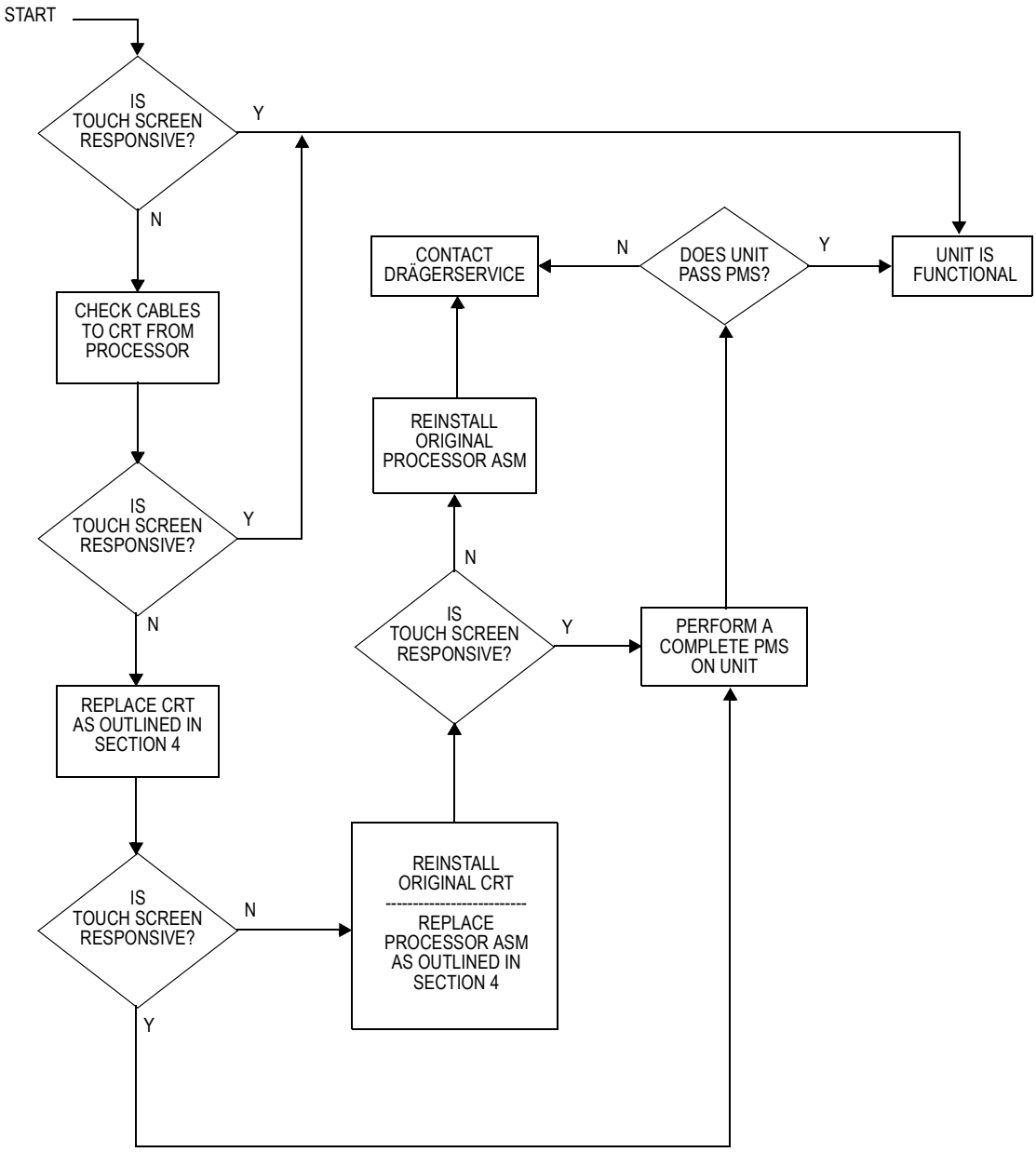
Guide 7: No Oxygen Supply Pressure Alarms



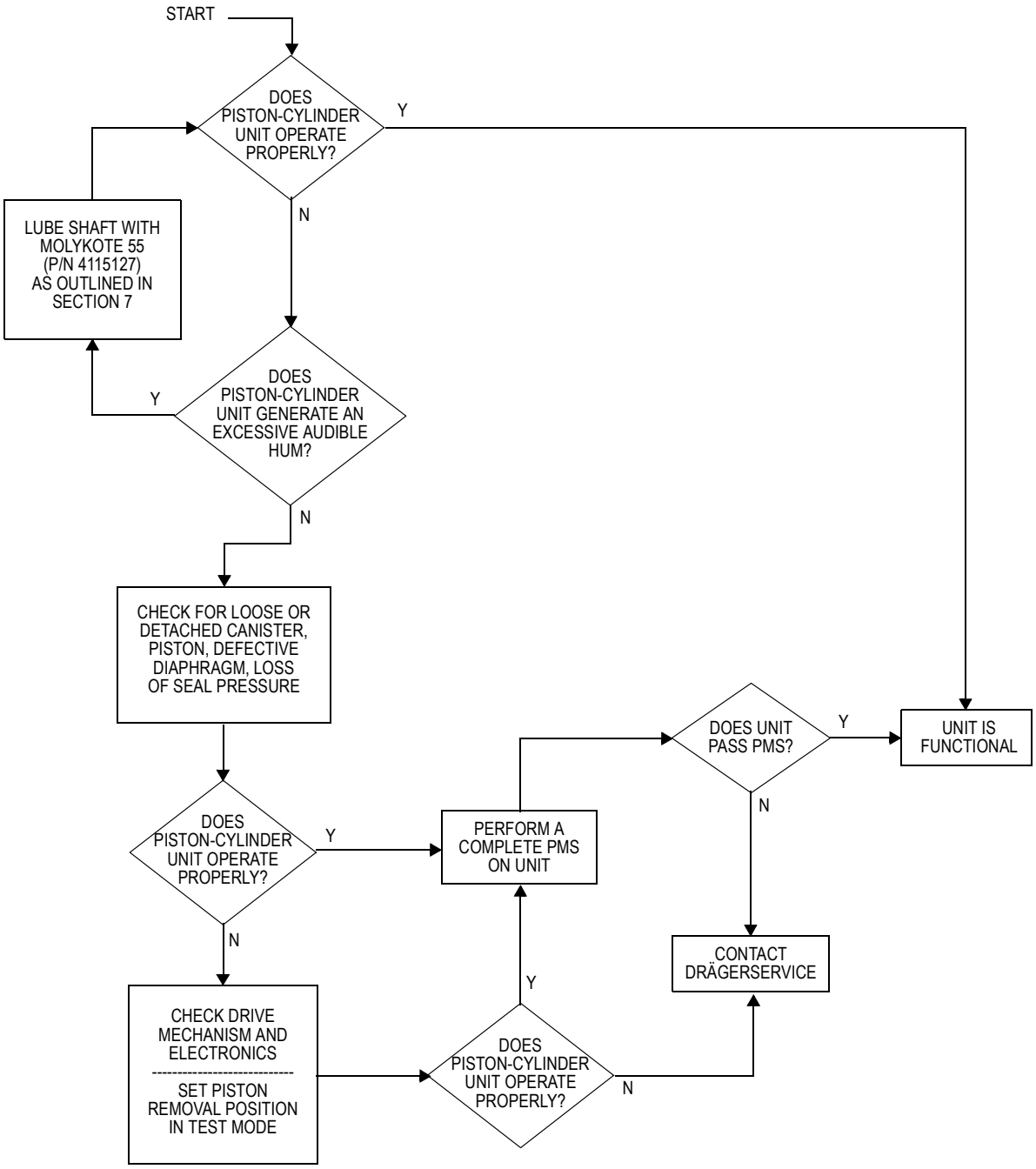
Guide 8: CRT Blank


START
IS CRT BLANK UPON SYSTEM POWER UP?
N
Y
CHECK POWER TO CRT, VIDEO CABLE
IS CRT BLANK UPON SYSTEM POWER UP?
N
Y
TURN MACHINE TO STANDBY AND DISABLE CIRCUIT BREAKERS. TEMPORARILY DISCONNECT VIDEO CABLE FROM WPU AND CONNECT IT TO VIDEO PORT OF LAPTOP COMPUTER. RESET CIRCUIT BREAKERS, TURN ON MACHINE AND LAPTOP COMPUTER.
IS NM6000 CRT BLANK UPON SYSTEM POWER UP?
N
Y
REPLACE CRT AS OUTLINED IN SECTION 4
IS NM6000 CRT BLANK UPON SYSTEM POWER UP?
Y
N
CONTACT DRÄGERSERVICE
N
DOES UNIT PASS PMS?
Y
UNIT IS FUNCTIONAL
REINSTALL ORIGINAL PROCESSOR ASM
Y
IS CRT BLANK UPON SYSTEM POWER UP?
N
PERFORM A COMPLETE PMS ON UNIT
REPLACE PROCESSOR ASM AS OUTLINED IN SECTION 4

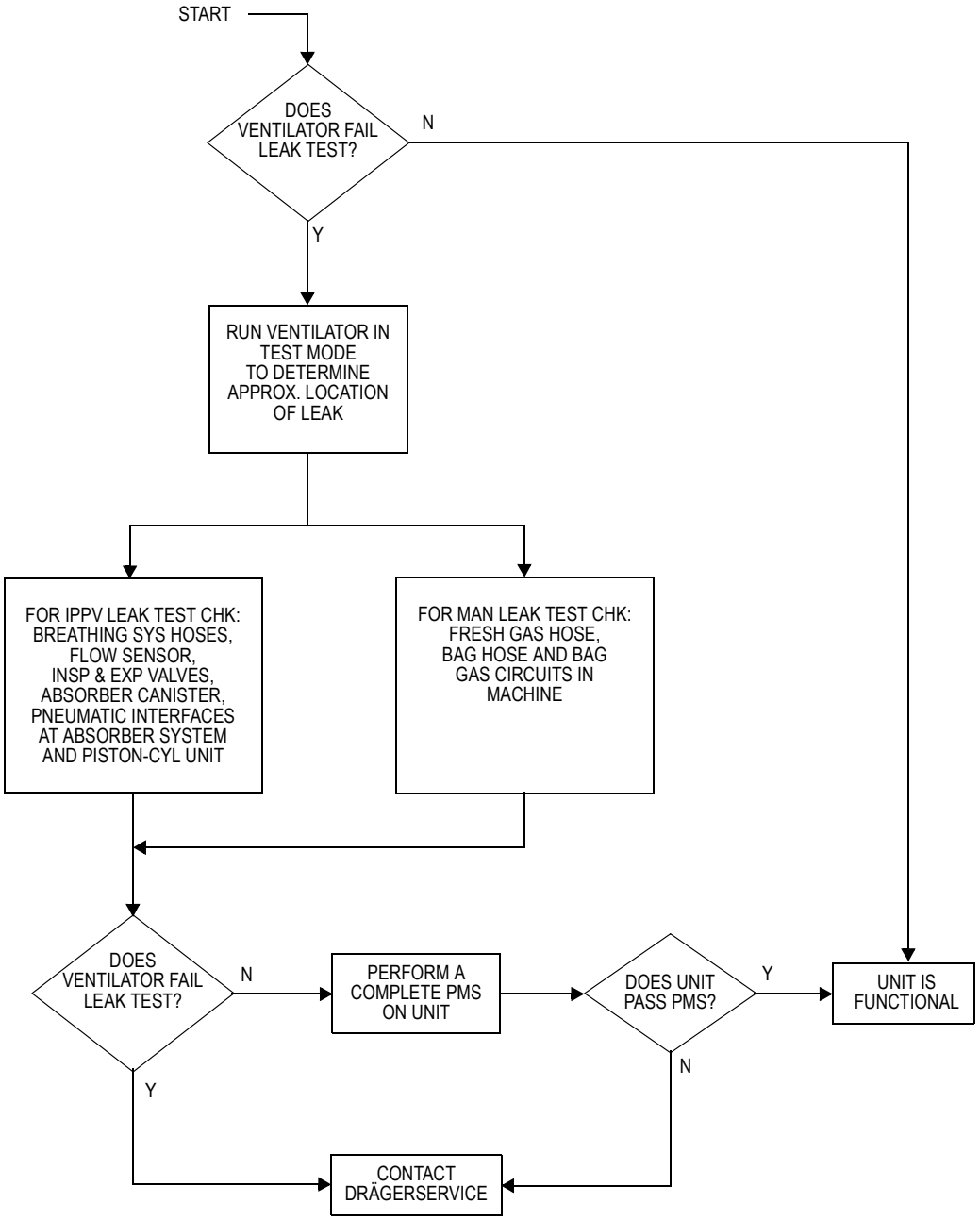
Guide 9: Touch Screen Not Responding



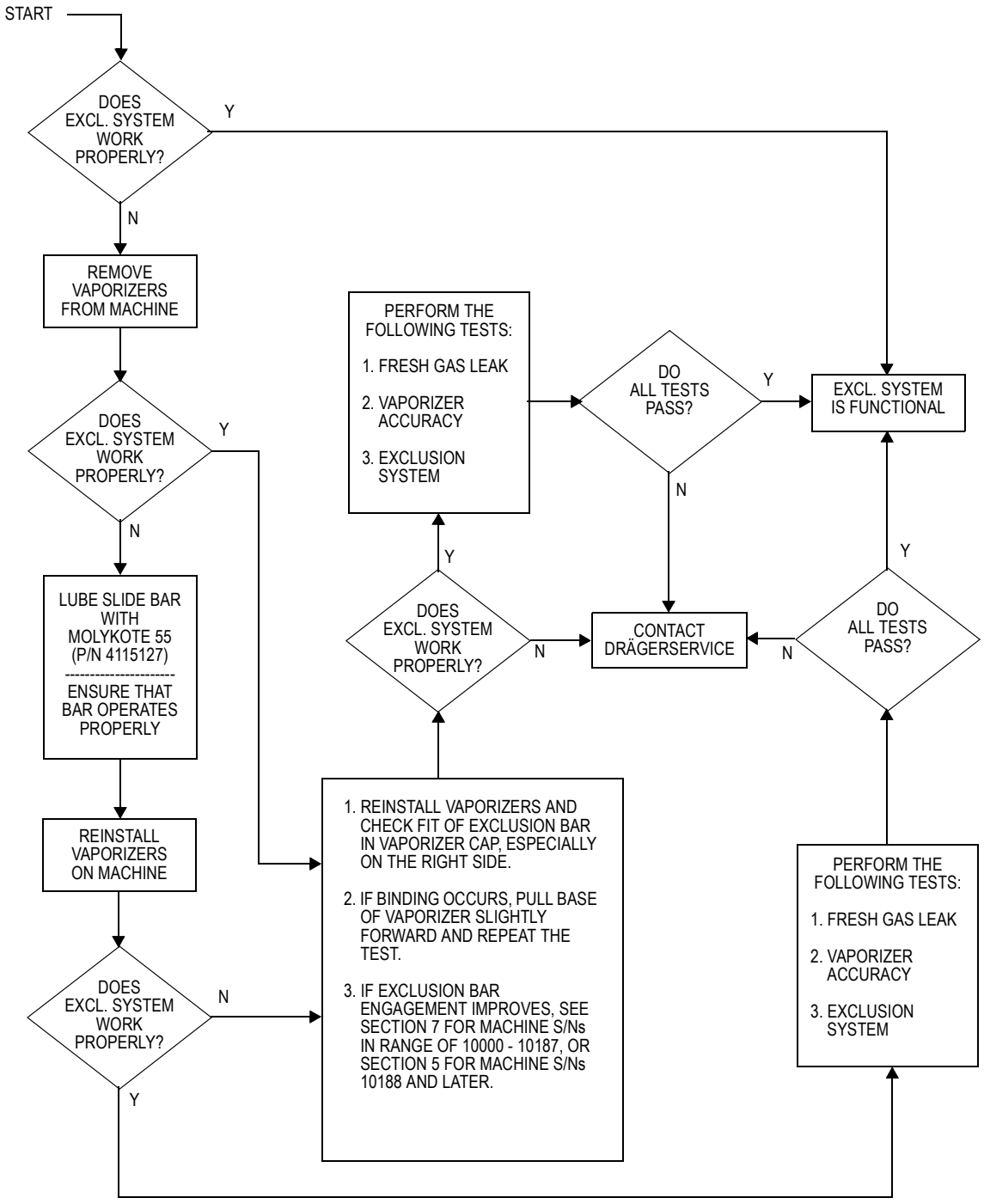
Guide 10: Ventilator Piston-Cylinder Unit Not Working



Guide 11: Leak Test Failure at Ventilator Start-up


START
DOES VENTILATOR FAIL LEAK TEST?
N
Y
RUN VENTILATOR IN TEST MODE TO DETERMINE APPROX. LOCATION OF LEAK
FOR IPPV LEAK TEST CHK: BREATHING SYS HOSES, FLOW SENSOR, INSP & EXP VALVES, ABSORBER CANISTER, PNEUMATIC INTERFACES AT ABSORBER SYSTEM AND PISTON-CYL UNIT
FOR MAN LEAK TEST CHK: FRESH GAS HOSE, BAG HOSE AND BAG GAS CIRCUITS IN MACHINE
DOES VENTILATOR FAIL LEAK TEST?
N
PERFORM A COMPLETE PMS ON UNIT
DOES UNIT PASS PMS?
Y
UNIT IS FUNCTIONAL
N
Y
CONTACT DRÄGERSERVICE

Guide 12: Vapor Exclusion System Sticking


START
DOES EXCL. SYSTEM WORK PROPERLY?
Y
N
REMOVE VAPORIZERS FROM MACHINE
DOES EXCL. SYSTEM WORK PROPERLY?
Y
N
LUBE SLIDE BAR WITH MOLYKOTE 55 (P/N 4115127)
ENSURE THAT BAR OPERATES PROPERLY
REINSTALL VAPORIZERS ON MACHINE
DOES EXCL. SYSTEM WORK PROPERLY?
N
Y
1. REINSTALL VAPORIZERS AND CHECK FIT OF EXCLUSION BAR IN VAPORIZER CAP, ESPECIALLY ON THE RIGHT SIDE.
2. IF BINDING OCCURS, PULL BASE OF VAPORIZER SLIGHTLY FORWARD AND REPEAT THE TEST.
3. IF EXCLUSION BAR ENGAGEMENT IMPROVES, SEE SECTION 7 FOR MACHINE S/Ns IN RANGE OF 10000 - 10187, OR SECTION 5 FOR MACHINE S/Ns 10188 AND LATER.
DOES EXCL. SYSTEM WORK PROPERLY?
Y
N
PERFORM THE FOLLOWING TESTS:
1. FRESH GAS LEAK
2. VAPORIZER ACCURACY
3. EXCLUSION SYSTEM
DO ALL TESTS PASS?
Y
N
EXCL. SYSTEM IS FUNCTIONAL
CONTACT DRÄGERSERVICE
DO ALL TESTS PASS?
Y
N
PERFORM THE FOLLOWING TESTS:
1. FRESH GAS LEAK
2. VAPORIZER ACCURACY
3. EXCLUSION SYSTEM

Guide 13: Can't Remove Ventilator Piston-Cylinder Unit

CAUTION: If the piston unit handle can not be lifted to its full up position, DO NOT force the handle up as this will damage the piston coupling assembly.

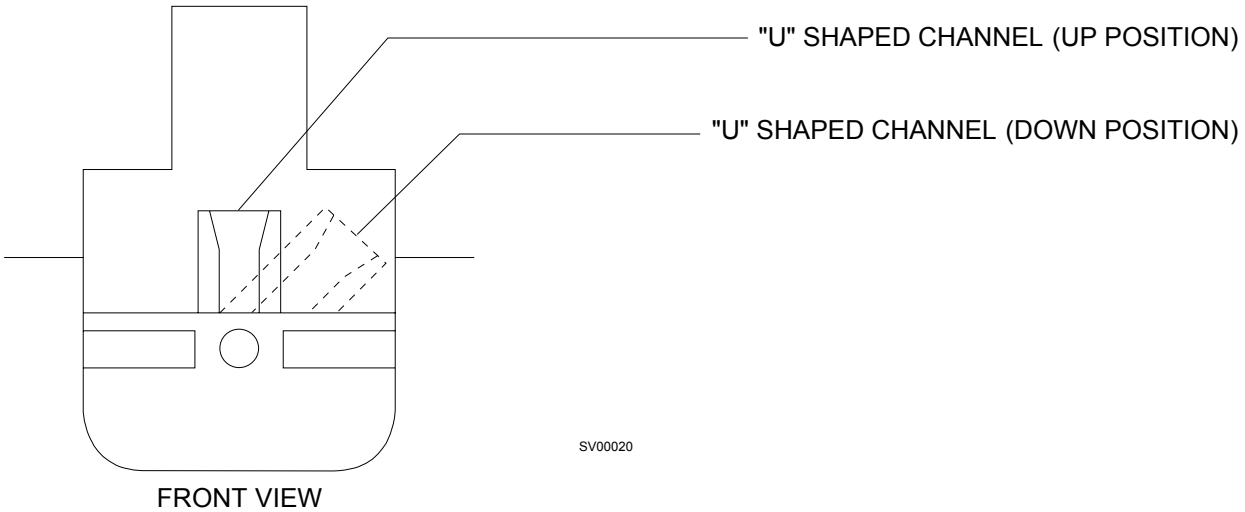
NOTE: For corrrect operation, the "U" shaped channel on the piston coupling assembly (see Figure 3-4) should be in the up position when the piston-cylinder unit is removed from the ventilator chassis, and should be in the down position when the piston unit is properly installed in the ventilator chassis.

If the "U" shaped channel is inadvertently left in the up position when the piston-cylinder unit is installed in an incorrect assembly sequence, the following procedure will restore correct operation.

1. Turn the System Power switch to STANDBY.
2. Turn the breathing system locking bar to its un-latched position, and ensure that the piston unit handle is in its down position.
3. Look through the window in the metal plate behind the piston-cylinder unit and observe the "U" shaped channel (see Figure 3-4). Using the red "T" handled Divan tool or a screwdriver, move the "U" shaped channel back approx. ½ in., and then push it to the right until it snaps out of view to its down position.

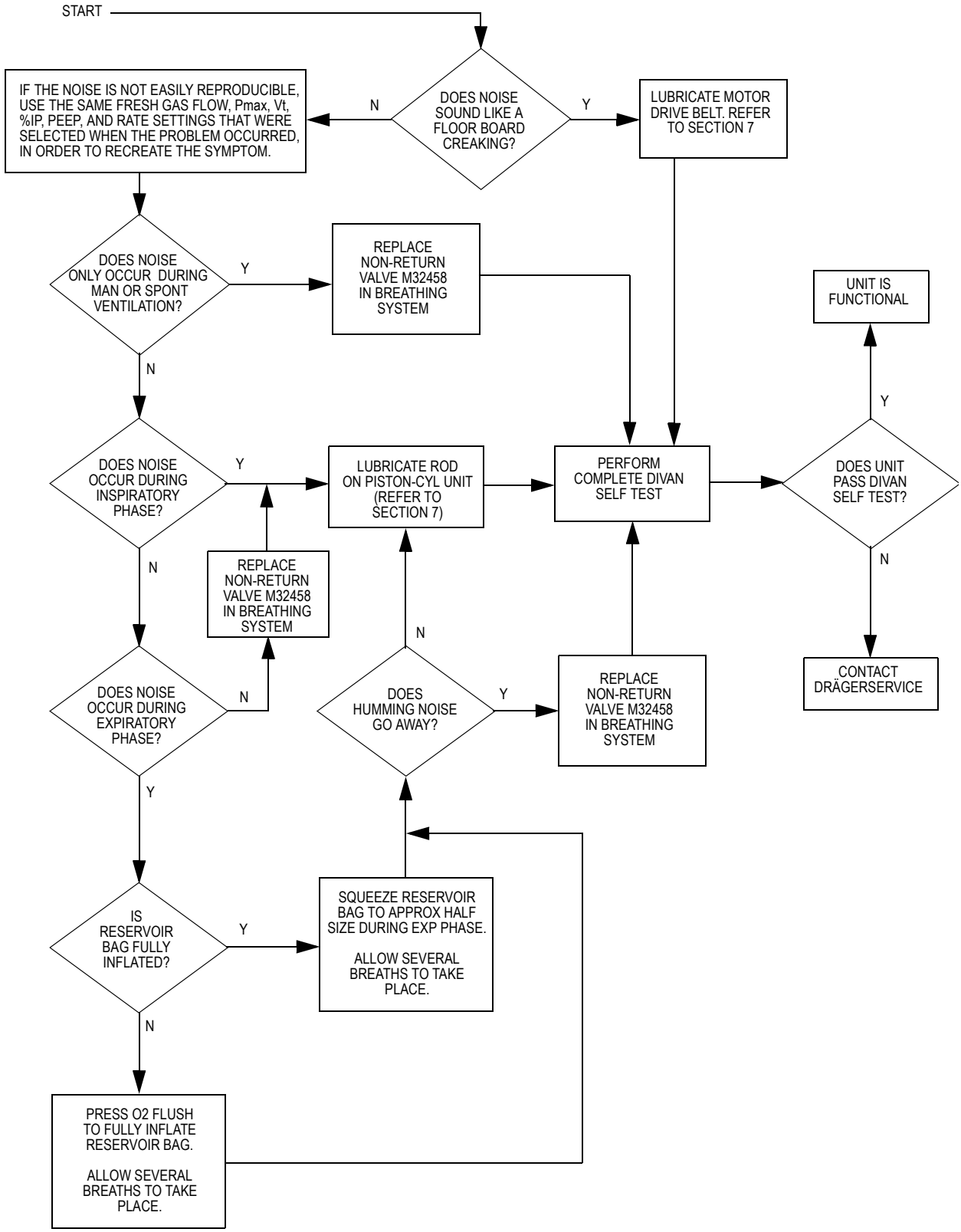
NOTE: The piston-cylinder unit handle must always be in its down position before latching the breathing system locking bar.

4. Turn the breathing system locking bar to its latched position.
5. Turn the System Power switch to ON, and allow the power-up sequence to complete. When the Divan displays "Standby" mode, it should be possible to remove and reinstall the piston-cylinder unit in the correct manner.



Piston Coupling Assembly - "U" Shaped Channel

Guide 14: Noise from Divan during mechanical ventilation


START
DOES NOISE SOUND LIKE A FLOOR BOARD CREAKING?
N
Y
IF THE NOISE IS NOT EASILY REPRODUCIBLE, USE THE SAME FRESH GAS FLOW, Pmax, Vt, %IP, PEEP, AND RATE SETTINGS THAT WERE SELECTED WHEN THE PROBLEM OCCURRED, IN ORDER TO RECREATE THE SYMPTOM.
LUBRICATE MOTOR DRIVE BELT. REFER TO SECTION 7
DOES NOISE ONLY OCCUR DURING MAN OR SPONT VENTILATION?
Y
N
REPLACE NON-RETURN VALVE M32458 IN BREATHING SYSTEM
UNIT IS FUNCTIONAL
DOES NOISE OCCUR DURING INSPIRATORY PHASE?
Y
N
LUBRICATE ROD ON PISTON-CYL UNIT (REFER TO SECTION 7)
PERFORM COMPLETE DIVAN SELF TEST
DOES UNIT PASS DIVAN SELF TEST?
Y
N
REPLACE NON-RETURN VALVE M32458 IN BREATHING SYSTEM
DOES NOISE OCCUR DURING EXPIRATORY PHASE?
N
Y
DOES HUMMING NOISE GO AWAY?
N
Y
REPLACE NON-RETURN VALVE M32458 IN BREATHING SYSTEM
CONTACT DRÄGERSERVICE
IS RESERVOIR BAG FULLY INFLATED?
Y
N
SQUEEZE RESERVOIR BAG TO APPROX HALF SIZE DURING EXP PHASE.
ALLOW SEVERAL BREATHS TO TAKE PLACE.
PRESS O2 FLUSH TO FULLY INFLATE RESERVOIR BAG.
ALLOW SEVERAL BREATHS TO TAKE PLACE.

4.0 REPLACEMENT PROCEDURES

This section outlines removal and replacement procedures for the field-replaceable assemblies of the Narkomed 6000 anesthesia system.

These procedures are to be performed only by a Draeger Medical, Inc. qualified Technical Service Representative (TSR).

The following are the only procedures authorized by Draeger Medical, Inc. to be performed in the field. All other service procedures shall be referred to DrägerService.

NOTE:

The PMC Procedure given in Section 6 (and Section 6A if the machine is equipped with an Integrated Patient Monitoring Module) must be performed after any replacement, removal, calibration or adjustment procedure.

Tools and test equipment needed:

--Ball-end hex wrenches with long extension
--Screwdriver (slotted) with long extension
--6 mm hex wrench (for Divan piston-cylinder unit and breathing system)
--3 mm hex wrench (for Divan electronics assembly)
--Socket tool P/N 4115140 for VPO assembly

4.1 Cylinder Yoke Assemblies

Each cylinder yoke contains a replaceable filter and check valve assembly. Replacement of this assembly requires that the yoke be removed from the anesthesia machine. A typical cylinder yoke mounting and connection arrangement is shown in Figure 4-1. Access to the yoke mounting screws and tubing requires removal of covers from the machine.

4.1.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

4.1.2 Close all cylinder valves except for one O_2 cylinder.

4.1.3 Set the oxygen flow to 5 L/min.

4.1.4 Open the other gas flow control valves to drain pressure from the system.

4.1.5 Close the O_2 cylinder valve, and close the flow control valves. Press the O_2 Flush valve to drain pressure from the system.

4.1.6 Turn the System Power switch to STANDBY.

4.1.7 Remove the cylinder where the yoke is to be replaced.

WARNING: Store the cylinder in a safe place and lay it on its side.

4.1.8 Remove the table lamp panel below the monitor.

4.1.9 Remove the rear panel below the yokes.

4.1.10 Disconnect the gas line fitting at the yoke and remove the two yoke mounting screws.

4.1.11 Remove the filter and check valve assembly from the yoke and install a replacement assembly.

NOTE: If the entire yoke assembly is being replaced, verify that the pin indexing arrangement and the label are in agreement with the gas designation stamped on the mounting surface of the yoke. Refer to the parts list in Section 8.

4.1.12 Position the yoke on the mounting rail, and install the two mounting screws and lock washer. Tighten the screws securely. Connect the gas line fitting to the yoke check valve.

4.1.13 If a new cylinder is being installed, remove the old sealing washer from the gas inlet of the yoke and install a new washer.

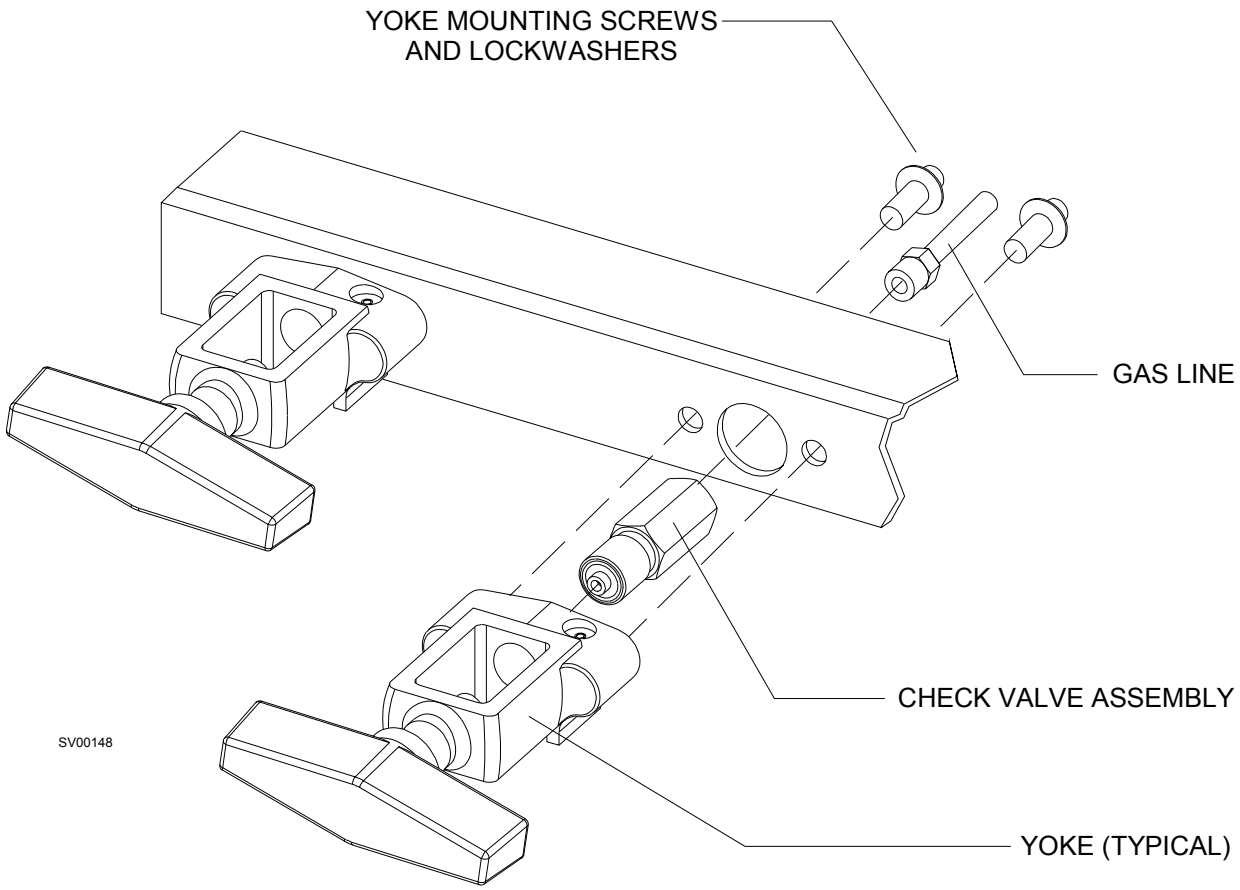


Figure 4-1. Cylinder Yoke Assembly

4.1.14 Install the correct cylinder in the yoke, making sure that the index pins are properly engaged before tightening the handle bolt. The cylinder should hang vertically after the handle is tight.

4.1.15 Perform the following leak test on the yoke assembly:

4.1.15.1 Open the cylinder valve and check for a pressure indication on the corresponding gauge at the front panel.

NOTE: The cylinder used for this test must contain the following minimum pressure:
O_2: 1000 psi
N_20: 700 psi
AIR: 1000 psi

4.1.15.2 Close the cylinder valve and remove the cylinder from the yoke.

4.1.15.3 For any gas, the pressure should not drop more than 50 psi in two minutes.

4.1.15.4 Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole directly above the power cord socket as shown in Figure 4-1A.

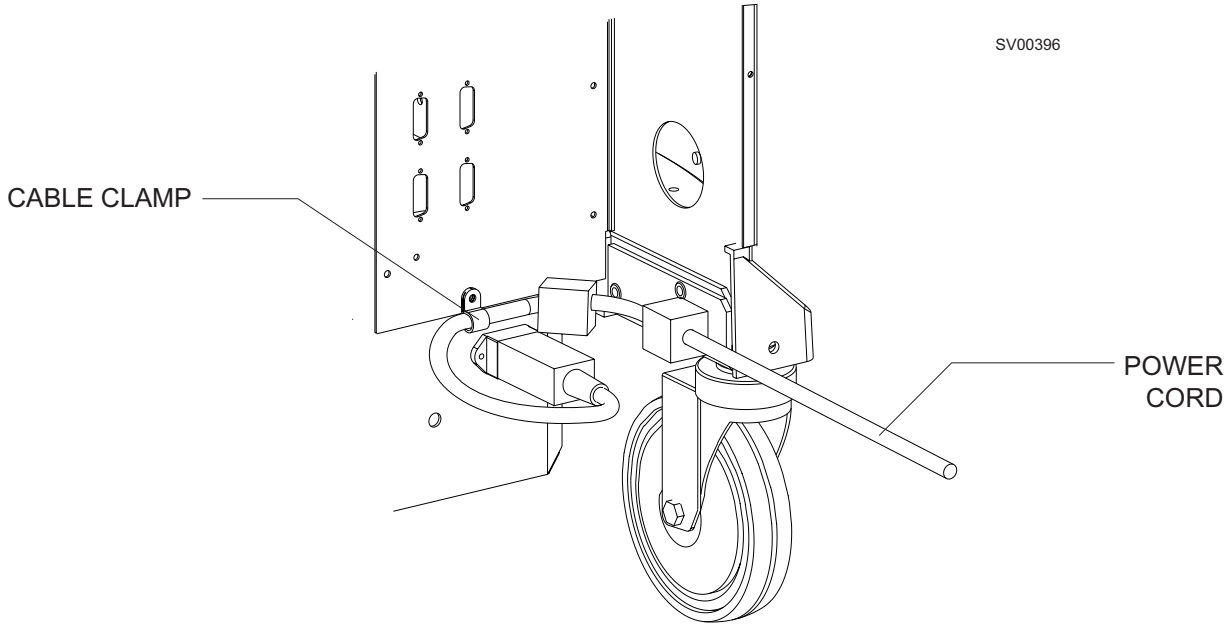


Figure 4-1A. Power Cord Routing

4.1.16 Reinstall the rear panel.

4.1.17 Reinstall the cylinder in the yoke.

4.1.18 Reinstall the table lamp panel below the monitor.

4.1.19 Reconnect the pipeline hoses.

4.1.20 Perform the PMC Procedure given in Section 6.

4.2 Cylinder Pressure Regulators

Access to the cylinder pressure regulators and their tubing connections requires that several panels be removed from the anesthesia machine. Each regulator is supported on its copper tubing; a typical regulator arrangement is shown in Figure 4-2.

4.2.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

4.2.2 Close all cylinder valves except for one O_2 cylinder.

4.2.3 Set the oxygen flow to 5 L/min.

4.2.4 Open the other gas flow control valves to drain pressure from the system.

4.2.5 Close the O_2 cylinder valve, and close the flow control valves. Press the O_2 Flush valve to drain pressure from the system.

4.2.6 Turn the System Power switch to STANDBY.

4.2.7 Remove the cylinders for access to the regulator area.

4.2.8 Remove the table lamp panel below the monitor.

4.2.9 Remove the rear panel below the yokes.

4.2.10 Disconnect the compression fittings at the regulator.

4.2.11 Record the serial number of the regulator that was removed, and record the serial number of the replacement regulator.

NOTE: If fittings must be installed in the replacement regulator, use Loctite #271 (red). Refer to the parts list in Section 8.

NOTE: For Canadian machines, verify that the correct relief valve is installed in the regulator. Refer to the parts list in Section 8 for CSA items.

4.2.12 Position the replacement regulator, connect and tighten the compression fittings.

4.2.13 Locate the test port in the regulator output line. Remove the plug from the port and connect a test gauge.

4.2.14 Reinstall the cylinders and set the regulator output pressure in accordance with the Cylinder Pressure Regulator Adjustment given in Section 5.

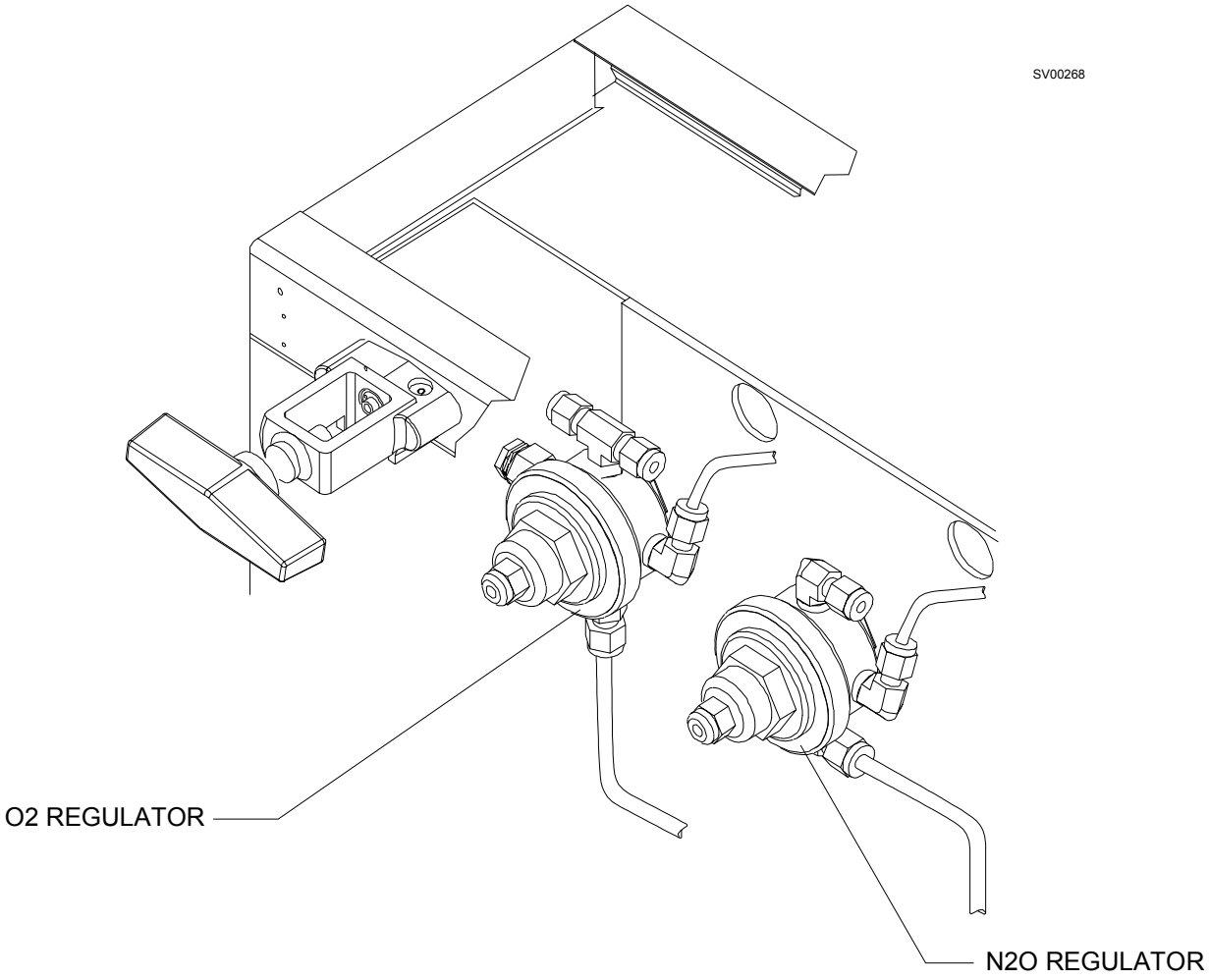


Figure 4-2. Cylinder Pressure Regulators

4.2.15 Perform the following leak test on the high pressure side of the regulator:

4.2.15.1 Open the cylinder valve and check for a pressure indication on the corresponding gauge at the front panel.

NOTE: The cylinder used for this test must contain the following minimum pressure:
O_2: 1000 psi
N_20: 700 psi
AIR: 1000 psi

4.2.15.2 Close the cylinder valve and remove the cylinder from the yoke.

4.2.15.3 For any gas, the pressure should not drop more than 50 psi in two minutes.

4.2.15.4 Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole directly above the power cord socket as shown in Figure 4-2A.

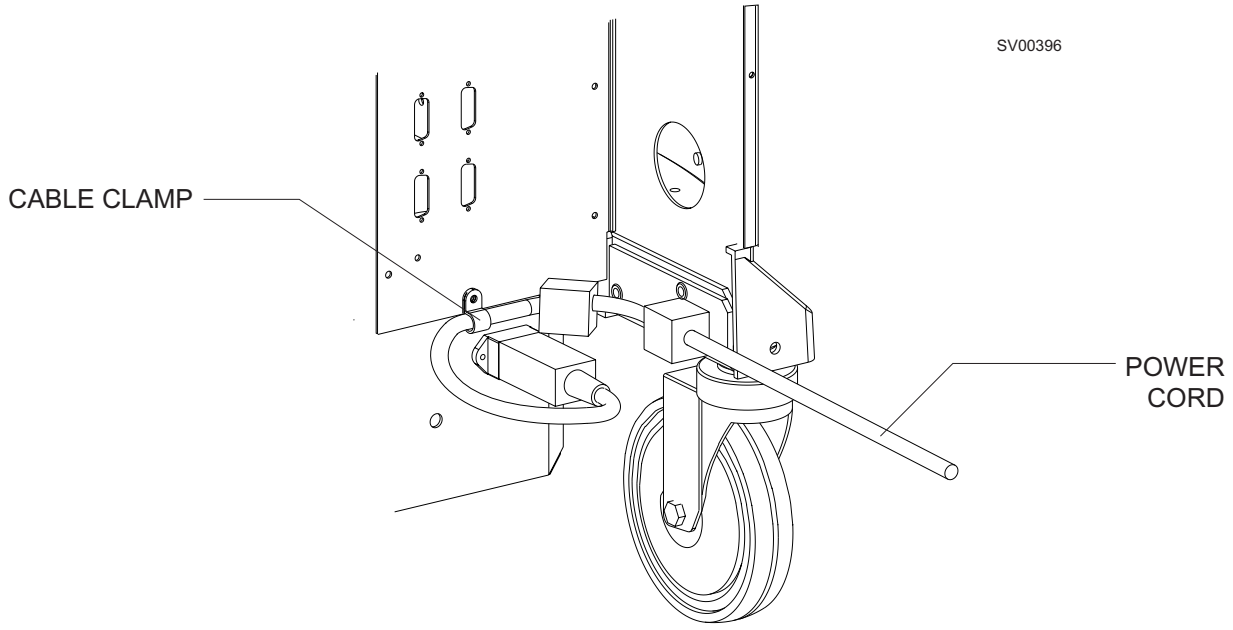


Figure 4-2A. Power Cord Routing

4.2.16 Reinstall the rear panel.

4.2.17 Reinstall the cylinder in the yoke.

4.2.18 Reinstall the table lamp panel below the monitor.

4.2.19 Reconnect the pipeline hoses.

4.2.20 Perform the PMC Procedure given in Section 6.

4.2A Cylinder Cutoff Valves (Canada)

Access to the cylinder cutoff valves requires removal of the back panel of the machine below the cylinder yokes. The tubing arrangement is similar for O2, N2O or Air, and is shown in Figure 4-2A.

4.2A.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

4.2A.2 Close all cylinder valves except one O2 valve.

4.2A.3 Set the oxygen flow to 5 L/min.

4.2A.4 Open the flow control valves to drain pressure from the system.

4.2A.5 Close the O2 cylinder valve, and close the flow control valves. Press the O2 flush valve to drain oxygen pressure from the system.

4.2A.6 Turn the System Power switch to STANDBY.

4.2A.7 Remove the cylinders for access to the regulator area.

4.2A.8 Remove the rear panel below the yokes.

4.2A.9 Disconnect the flexible tubing from the cutoff valve assembly at the point marked A on the illustration detail.

4.2A.10 Disconnect the compression fittings at points marked C on the illustration detail.

4.2A.11 Remove the cutoff valve assembly.

4.2A.12 Install the replacement cutoff valve assembly and tighten the compression fittings.

4.2A.13 Connect the flexible tubing to the replacement assembly and secure it with the press-on hose clamp.

4.2A.14 Perform the following test:

NOTE: The cylinders used for this test must contain the following minimum pressure: O2: 1000 psi; N2O: 745 psi; Air: 1000 psi.

-- Install the cylinders in the yokes.

-- For the O2 cutoff valve: open the O2 cylinder valve and set the oxygen flow to 4 L/min.

-- For the N2O or Air cutoff valve: open the O2 cylinder valve and the N2O or Air cylinder valve. Set each flow to 4 L/min.

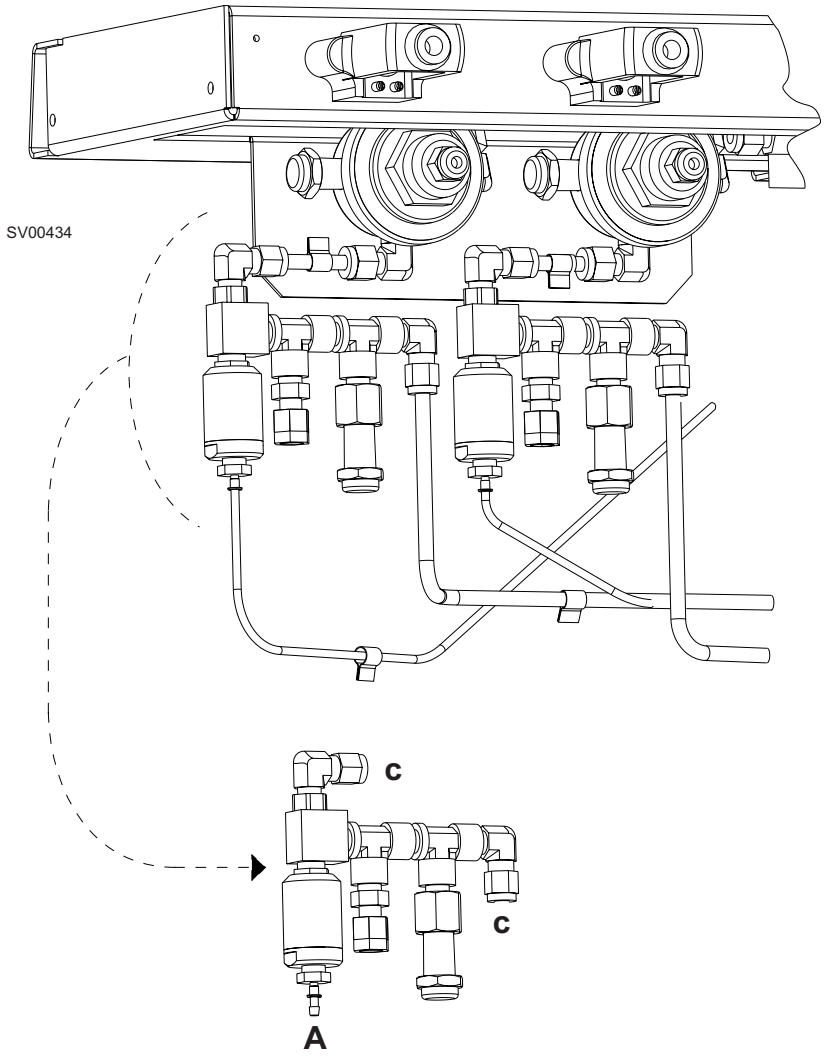


Figure 4-2A. Cylinder Cutoff Valve Piping Arrangement

-- Connect the pipeline hoses.

-- Turn off the pipeline supply and observe the pipeline pressure gauge(s). The 4 L/min. flow(s) shall be maintained when the pipeline pressure drops through the range of 45 to 40 psi.

-- Close the cylinder valves and close the flow control valves.

-- Turn the System Power switch to STANDBY.

4.2A.15 Remove the cylinders and reinstall the back panel on the machine.

4.2A.16 Perform the PMC Procedure given in Section 6.

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4.3 Cylinder and Pipeline Pressure Gauges

Replacement of the cylinder and pipeline pressure gauges requires that the flowmeter shield and the rear flowmeter housing cover be removed from the anesthesia machine. Gauge connection and mounting details are shown in Figure 4-3.

4.3.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

4.3.2 Close all cylinder valves except for one O_2 cylinder.

4.3.3 Set the oxygen flow to 5 L/min.

4.3.4 Open the other gas flow control valves to drain pressure from the system.

4.3.5 Close the O_2 cylinder valve, and close the flow control valves. Press the O_2 Flush valve to drain pressure from the system.

4.3.6 Turn the System Power switch to STANDBY.

4.3.7 Remove the flowmeter housing back cover.

4.3.8 Loosen the captive mounting screw on the gas analyzer pod and slide the pod outward to gain better access to the flowmeter housing. Do the same for any other pod projecting inside the flowmeter housing.

4.3.9 Remove the oxygen flow control knob. The knob has two setscrews

NOTE: If the knob must be rotated to allow access to a setscrew, carefully note its position so that it can be re-assembled in the same position with the "Off Stop" properly set.

4.3.10 Remove the two screws holding the knob guard in place, and remove the knob guard.

4.3.11 Carefully remove the plexiglass flowmeter shield.

4.3.12 At the back of the gauge, disconnect the compression fitting (cylinder gauges) or flexible tubing (pipeline gauges).

4.3.13 Remove the gauge mounting nuts, and remove the gauge from the front of the panel.

4.3.14 Install the replacement gauge in the panel using the mounting nuts that were removed in the previous step.

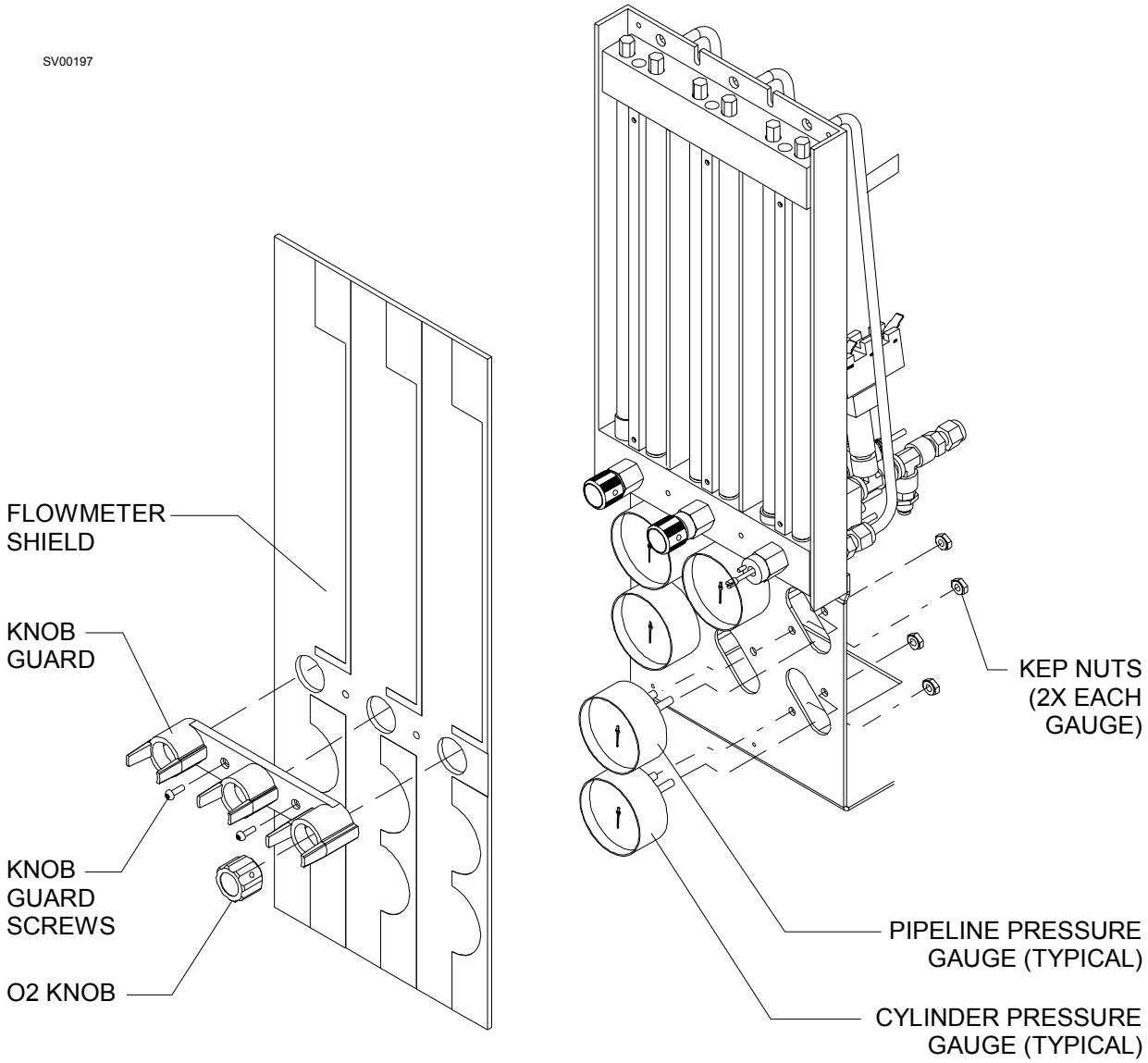


Figure 4-3. Cylinder and Pipeline Pressure Gauges

4.3.15 For pipeline gauges, install a new length of flexible tubing. Secure each end with a press-on hose clamp and install an appropriate label on each end of the tube.

For cylinder gauges, reconnect the compression fitting and perform the following leak test:

4.3.15.1 Open the cylinder valve and check for a pressure indication on the corresponding gauge at the front panel.

NOTE: The cylinder used for this test must contain the following minimum pressure:

O_2: 1000 psi
N_20: 700 psi
AIR: 1000 psi

4.3.15.2 Close the cylinder valve and remove the cylinder from the yoke.

4.3.15.3 For any gas, the pressure should not drop more than 50 psi in two minutes.

4.3.16 Reinstall the cylinder in the yoke.

4.3.17 Reinstall the plexiglass flowmeter shield.

4.3.18 Place the knob guard over the flow control valves (ensure that the large clearance hole is over the oxygen flow control valve) and install its two retaining screws.

4.3.19 Install the oxygen flow control knob and tighten its setscrews. If the knobs are installed properly, their labels will be straight when the knobs are against their clockwise stops.

4.3.20 Return the gas analyzer pod (and any other pod) to its original position, and tighten its captive mounting screw.

4.3.21 Reinstall the flowmeter housing rear cover.

4.3.22 Reconnect the pipeline hoses.

4.3.23 Perform the PMC Procedure given in Section 6.

4.4 Flowmeters

The flowmeter tubes are held by compression in gaskets at the top and bottom of each tube. Each upper gasket is seated in an adjustable retainer that allows removal of the tube as shown in Figure 4-4. Access to the flow tubes and their retainers requires removal of the plexiglass flowmeter shield.

4.4.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

4.4.2 Close all cylinder valves except for one O_2 cylinder.

4.4.3 Set the oxygen flow to 5 L/min.

4.4.4 Open the other gas flow control valves to drain pressure from the system.

4.4.5 Close the O_2 cylinder valve, and close the flow control valves. Press the O_2 Flush valve to drain pressure from the system.

4.4.6 Turn the System Power switch to STANDBY.

4.4.7 Remove the oxygen flow control knob. The knob has two setscrews

NOTE: If the knob must be rotated to allow access to a setscrew, carefully note its position so that it can be re-assembled in the same position with the "Off Stop" properly set.

4.4.8 Remove the two screws holding the knob guard in place, and remove the knob guard.

4.4.9 Carefully remove the plexiglass flowmeter shield.

4.4.10 Loosen the retainer screw directly above the flowmeter tube to be replaced. Turning the screw counter-clockwise will raise the upper flow tube retainer. Raise the retainer far enough to be able to pull the top of the tube outward, and remove the tube.

NOTE: It will be easier to hold the tube if the adjacent lighting channel is pulled forward and temporarily removed.

NOTE: If the bottom of the tube is seated in a flow restrictor, be sure that the arrangement of the restrictor and its gaskets is not disturbed.

4.4.11 Make sure that the replacement flow tube bears the correct markings and has a ball.

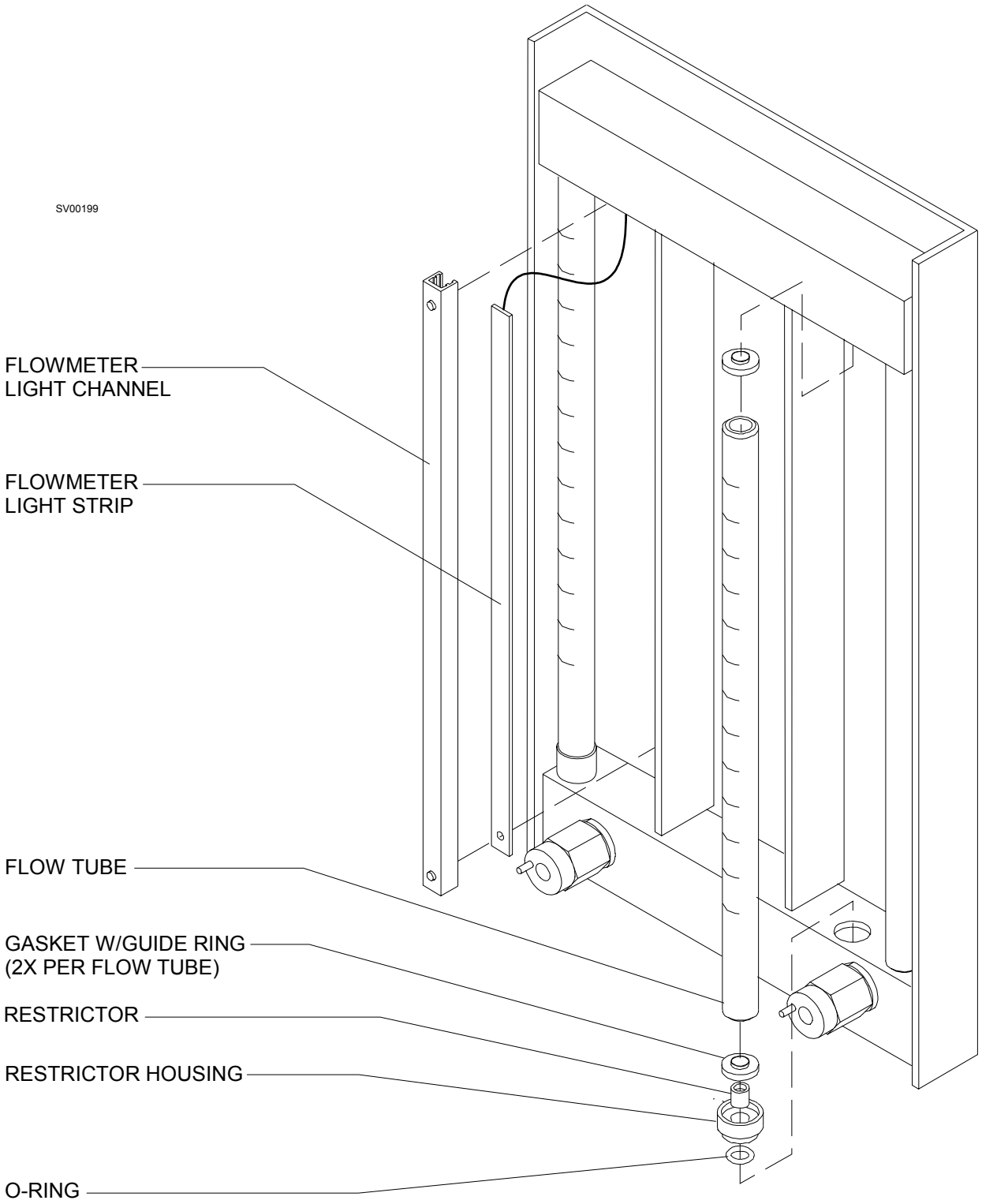


Figure 4-4. Flowmeters

4.4.12 Place the bottom of the flow tube into the guide ring of the lower gasket, and position the top of the flow tube into the center guide ring of the top gasket.

CAUTION: the flowmeter tube must be properly centered over the guide rings or damage to the flowmeter tube may occur.

4.4.13 Ensure that the markings on the flow tube are facing forward, and turn the upper retainer screw clockwise until the flow tube is firmly held in place.

CAUTION: Do not over-tighten the screw as the flowmeter tube may break.

4.4.14 Perform the following leak test on the system:

4.4.14.1 Disconnect the fresh gas hose from the breathing system; ensure that all flow control valves are closed.

4.4.14.2 Connect a test gauge and B.P. bulb to the fresh gas hose, and pressurize the system to 50 cm H_2O.

4.4.14.3 The pressure should not drop more than 10 cm H_2O in thirty seconds.

4.4.15 Disconnect the test gauge and Reconnect the fresh gas hose to the breathing system.

4.4.16 Replace any lighting channels that were previously removed.

4.4.17 Reinstall the plexiglass flowmeter shield.

4.4.18 Place the knob guard over the flow control valves (ensure that the large clearance hole is over the oxygen flow control valve) and install its two retaining screws.

4.4.19 Install the oxygen flow control valve and tighten its setscrews. If the knobs are installed properly, their labels will be straight when the knobs are against their clockwise stops.

4.4.20 Reconnect the pipeline hoses.

4.4.21 Perform the PMC Procedure given in Section 6.

4.5 Flow Control Valves

The flow control valves have replaceable elements that are removable from the front of the gas instrumentation panel as shown in Figure 4-5. Each flow control knob has a clockwise positive stop arrangement that prevents damage to the valve seat. Whenever a valve cartridge is replaced, its "off stop" must be set as outlined in the following procedure.

4.5.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

4.5.2 Close all cylinder valves except for one O_2 cylinder.

4.5.3 Set the oxygen flow to 5 liters per min.

4.5.4 Open the other gas flow control valves to drain pressure from the system.

4.5.5 Close the O_2 cylinder valve and the O_2 flow control valve. Press the O_2 Flush valve to drain oxygen pressure from the system.

4.5.6 Turn the System Power switch to STANDBY.

4.5.7 Remove the oxygen flow control knob.

4.5.8 Remove the two screws holding the knob guard in place, and remove the knob guard.

4.5.9 Remove the knob (if not already removed) from the valve that is being replaced, and remove the stop pin nut.

4.5.10 Remove the flow control valve by holding it at the wrench flats and turning it counter-clockwise.

4.5.11 Install the replacement flow control valve in the valve body.

CAUTION: Before tightening the cartridge, rotate the valve shaft several turns counter-clockwise to prevent bottoming the valve element into the seat when the cartridge is tightened.

4.5.12 Reinstall the stop pin nut.

4.5.13 Place the knob guard over the flow control valves (ensure that the large clearance hole is over the oxygen flow control valve) and install its two retaining screws.

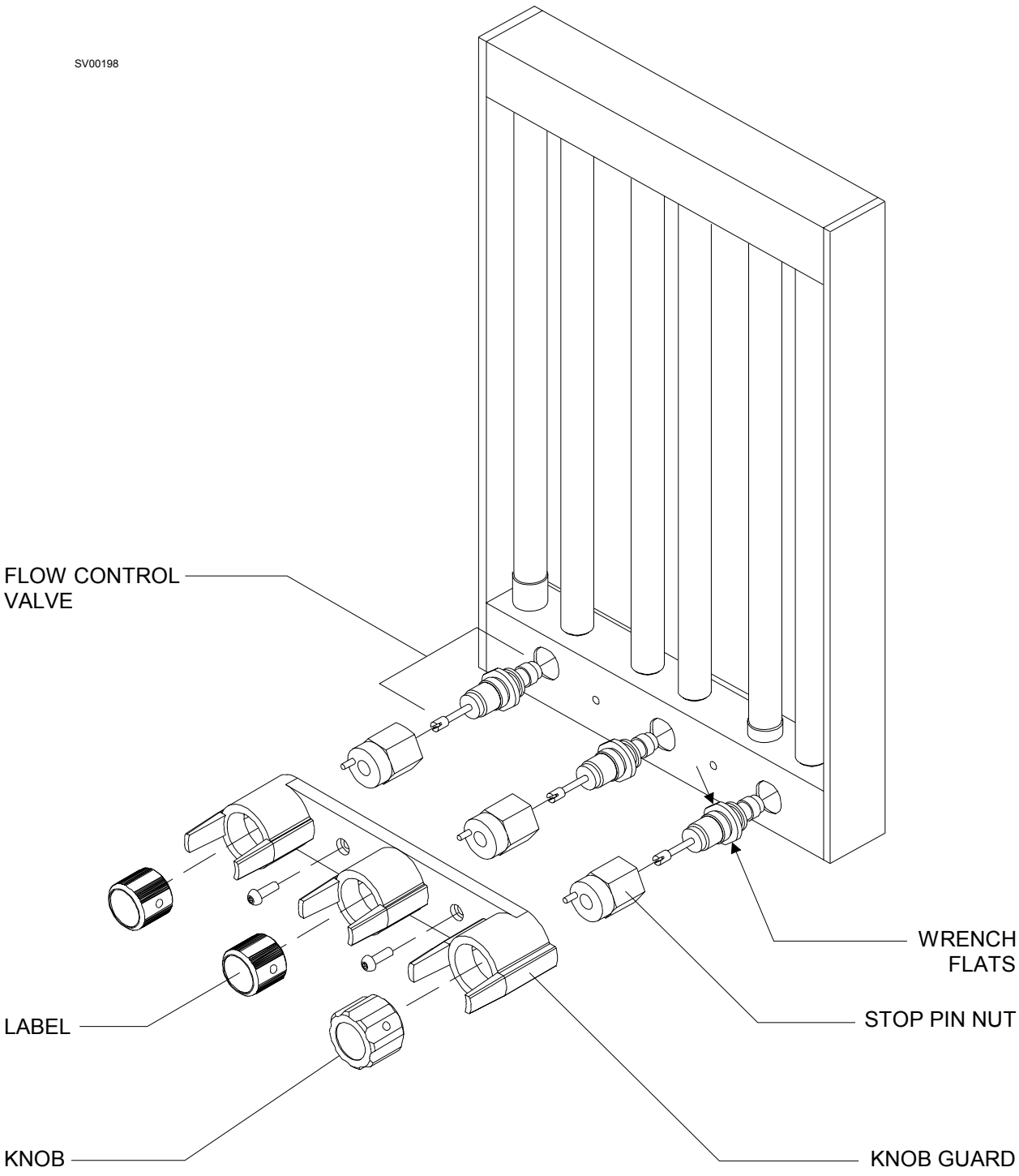


Figure 4-5. Flow Control Valves

4.5.14 Turn the System Power switch to ON.

4.5.15 Reconnect the pipeline hoses.

4.5.16 For the oxygen flow control valve:

Turn the flow control valve clockwise until the flow rate will not drop any further.

4.5.17 For the other gas flow control valves:

Set the oxygen flow rate to 4 L/min.

Turn the other gas flow control valve clockwise until the flow rate is zero.

4.5.18 Place the knob on the flow control valve shaft and turn it clockwise until it engages the stop pin. Tighten one of the knob setscrews.

4.5.19 Turn the knob in both directions and ensure that the flow can be controlled over its entire range. When the valve is closed, the knob should be against its clockwise stop. Tighten the remaining setscrew.

4.5.20 If the knob label is not horizontal when the valve is closed, remove the label and install a new label in the correct position.

4.5.21 Perform the PMC Procedure given in Section 6.

4.6 Minimum O2 Flow Cutoff Solenoid

The minimum O_2 flow cutoff solenoid is located on the back of the O_2 block in the flowmeter housing. The mounting and connection arrangement is shown in Figure 4-6.

4.6.1 Disconnect all pipeline hoses and close all cylinder valves.

4.6.2 Press the O_2 Flush valve to drain oxygen pressure from the system.

4.6.3 Turn the System Power switch to STANDBY.

4.6.4 Remove the flowmeter housing back cover.

4.6.5 Loosen the captive mounting screw on the gas analyzer pod and slide the pod outward to gain better access to the flowmeter housing. Do the same for any other pod projecting inside the flowmeter housing.

4.6.6 Disconnect the wire harness from the solenoid terminals.

4.6.7 Note the tubing connection arrangement, and disconnect the flexible tubing from the hose barbs on the solenoid.

4.6.8 Remove the screws securing the mounting bracket to the O_2 block, and remove the assembly from the machine.

4.6.9 If the replacement is not supplied with a bracket, transfer the existing bracket to the replacement solenoid.

4.6.10 Install the replacement bracket and solenoid assembly to the O_2 block with the hardware that was previously removed.

4.6.11 Reconnect the flexible tubing and secure each connection with a press-on hose clamp.

4.6.12 Reconnect the wire harness to the solenoid terminals.

4.6.13 Reconnect the pipeline supplies and perform the following test:

4.6.13.1 Turn the System Power switch to ON.

4.6.13.2 Observe the O_2 flowmeter during the ventilator self test period.

The O_2 flow should drop to zero during a portion of the self test.

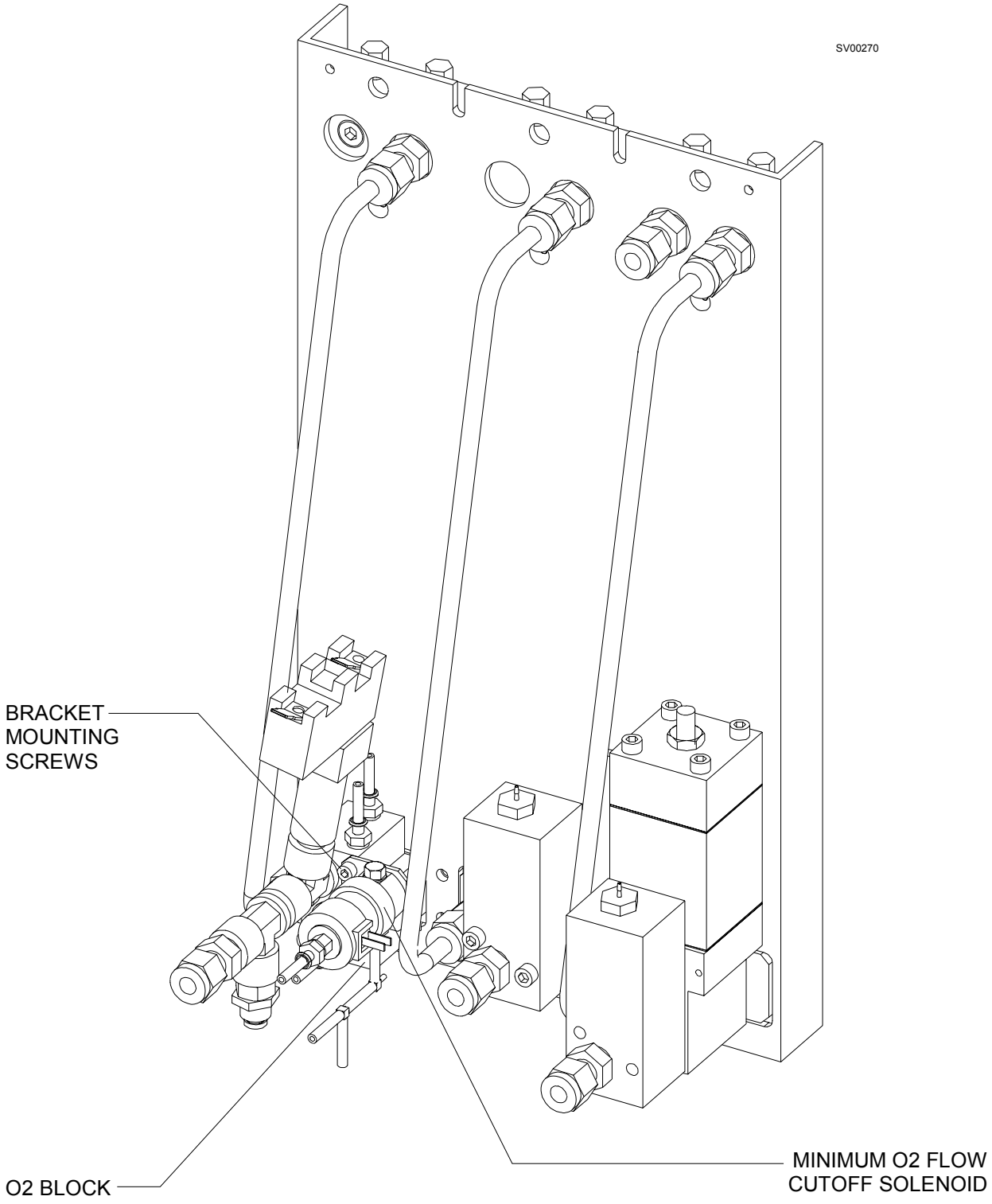


Figure 4-6. Minimum O_2 Flow Cutoff Solenoid

4.6.14 Turn the System Power switch to STANDBY.

4.6.15 Return the gas analyzer pod (and any other pod) to its original position, and tighten its captive mounting screw.

4.6.16 Reinstall the flowmeter housing back cover.

4.6.17 Reconnect the pipeline hoses.

4.6.18 Perform the PMC Procedure given in Section 6.

4.7 Auxiliary Oxygen Flow Meter

The auxiliary oxygen flowmeter is attached to the inside of the front panel by two Z-brackets. Access to the attaching hardware and tubing connections requires removal of the flowmeter housing back cover, and removal of the bottom plate below the system power switch as shown in Figure 4-7.

4.7.1 Disconnect all pipeline hoses and close all cylinder valves.

4.7.2 Press the O_2 Flush valve to drain oxygen pressure from the system.

4.7.3 Turn the System Power switch to STANDBY and remove AC power from the machine.

4.7.4 Pull the circuit breaker knobs to their 'out' position.

4.7.5 Remove the flowmeter housing back cover.

4.7.6 Loosen the captive mounting screw on the gas analyzer pod and slide the pod outward to gain better access to the flowmeter housing. Do the same for any other pod projecting inside the flowmeter housing.

4.7.7 Remove the bottom plate below the system power switch, and disconnect the flexible tube attached to the back of the auxiliary O_2 outlet.

4.7.8 Remove the Auxiliary O_2 flowmeter knob.

4.7.9 Loosen (do not remove!) the mounting screw holding the upper Z-bracket approximately ½ turn by reaching through the flowmeter housing with a ball-end hex wrench on a long extension.

4.7.10 From the bottom, loosen the lower mounting screw until the lower Z-bracket can be moved away from the flowmeter, then pull the flowmeter toward the bottom of the panel.

4.7.11 Disconnect the flexible O_2 supply tubing from the hose barb on the flowmeter, and remove the flowmeter.

4.7.12 If applicable, transfer the output tubing to the upper hose barb on the replacement flowmeter.

4.7.13 Position the replacement flowmeter behind the panel; attach the O_2 supply tube to the lower hose barb and secure it with a press-on hose clamp.

4.7.14 Slide the flowmeter up into the upper Z-bracket. Move the lower Z-bracket into the correct position, and tighten the mounting screws.

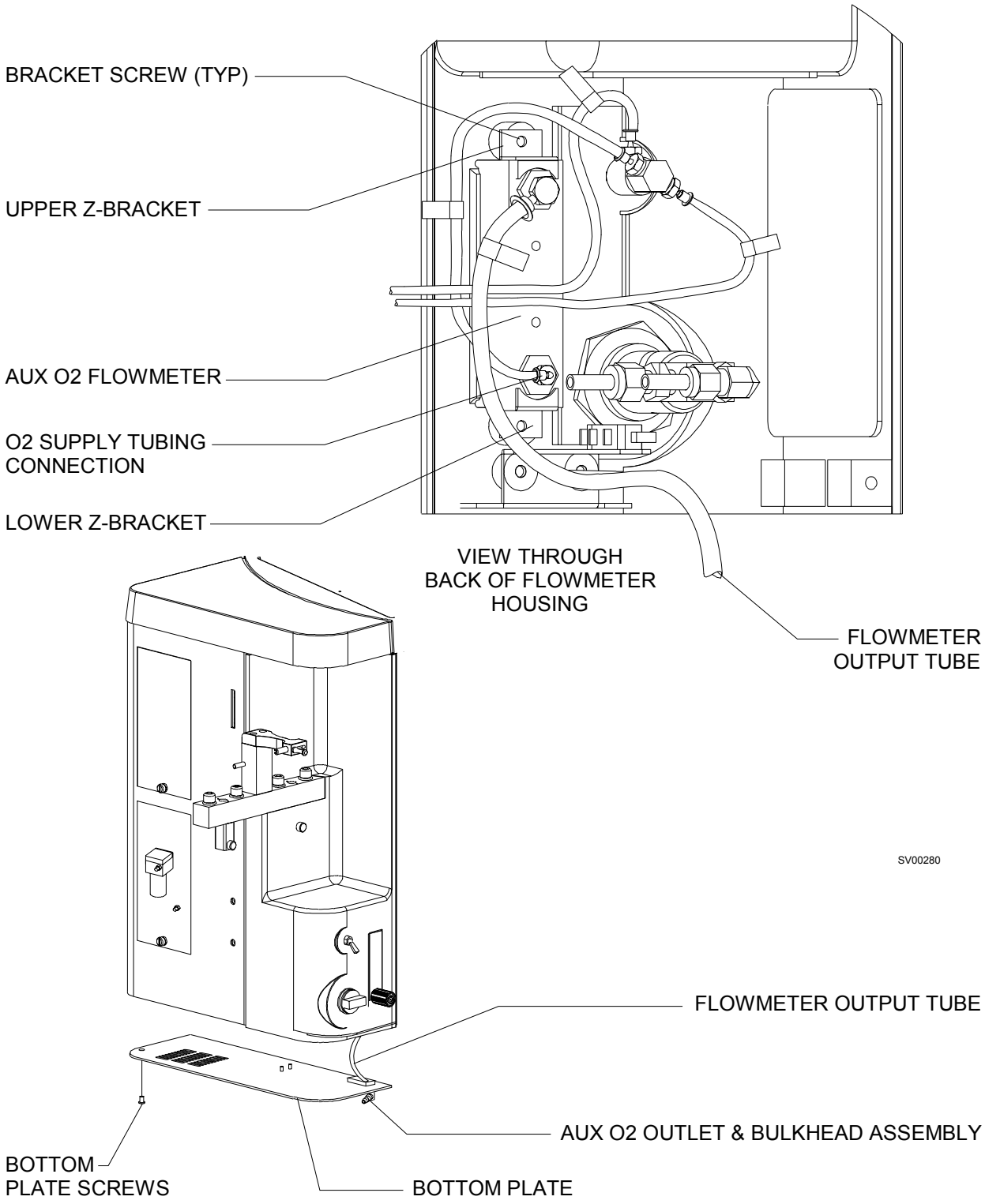


Figure 4-7. Auxiliary Oxygen Flowmeter

4.7.15 Reconnect the output tube to the auxiliary O_2 outlet on the bottom plate, and reinstall the bottom plate.

4.7.16 Return the gas analyzer pod (and any other pod) to its original position, and tighten its captive mounting screw.Reinstall the auxiliary O_2 flowmeter knob.

4.7.17 Reinstall the flowmeter housing back cover.

4.7.18 Connect the pipeline hoses and restore AC power to the machine.

4.7.19 Restore all circuit breakers to their 'in' position.

4.7.20 Perform the PMC Procedure given in Section 6.

4.8 Oxygen Supply Pressure Failure Protection Device

The air and nitrous oxide supplies within the machine are monitored by oxygen supply failure protection devices (OFPDs) which prevent the flow of these gases if there is insufficient oxygen pressure available. Access to these devices requires removal of the flowmeter housing back cover. Mounting and connection details are shown in Figure 4-8.

4.8.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

4.8.2 Close all cylinder valves except for one O_2 cylinder.

4.8.3 Set the oxygen flow to 5 liters per min.

4.8.4 Open the other gas flow control valves to drain pressure from the system.

4.8.5 Close the O_2 cylinder valve and the O_2 flow control valve. Press the O_2 Flush valve to drain oxygen pressure from the system.

4.8.6 Turn the System Power switch to STANDBY.

4.8.7 Remove the flowmeter housing back cover.

4.8.8 Loosen the captive mounting screw on the gas analyzer pod and slide the pod outward to gain better access to the flowmeter housing. Do the same for any other pod projecting inside the flowmeter housing.

4.8.9 Disconnect the copper tube at the back of the OFPD.

4.8.10 Disconnect the flexible tubing from the hose barb at the top of the OFPD.

4.8.11 Remove the three screws securing the OFPD to the flowmeter sub-assembly, and remove the OFPD.

NOTE: The N_2O OFPD has longer screws, which pass through the oxygen ratio controller (ORC) and into the flowmeter sub-assembly. These screws retain both devices.

4.8.12 Ensure that the O-rings are correctly in place, and install the replacement OFPD with the hardware that was previously removed.

4.8.13 Reconnect the small diameter tubing to the hose barb on the OFPD and secure the connection with a press-on hose clamp.

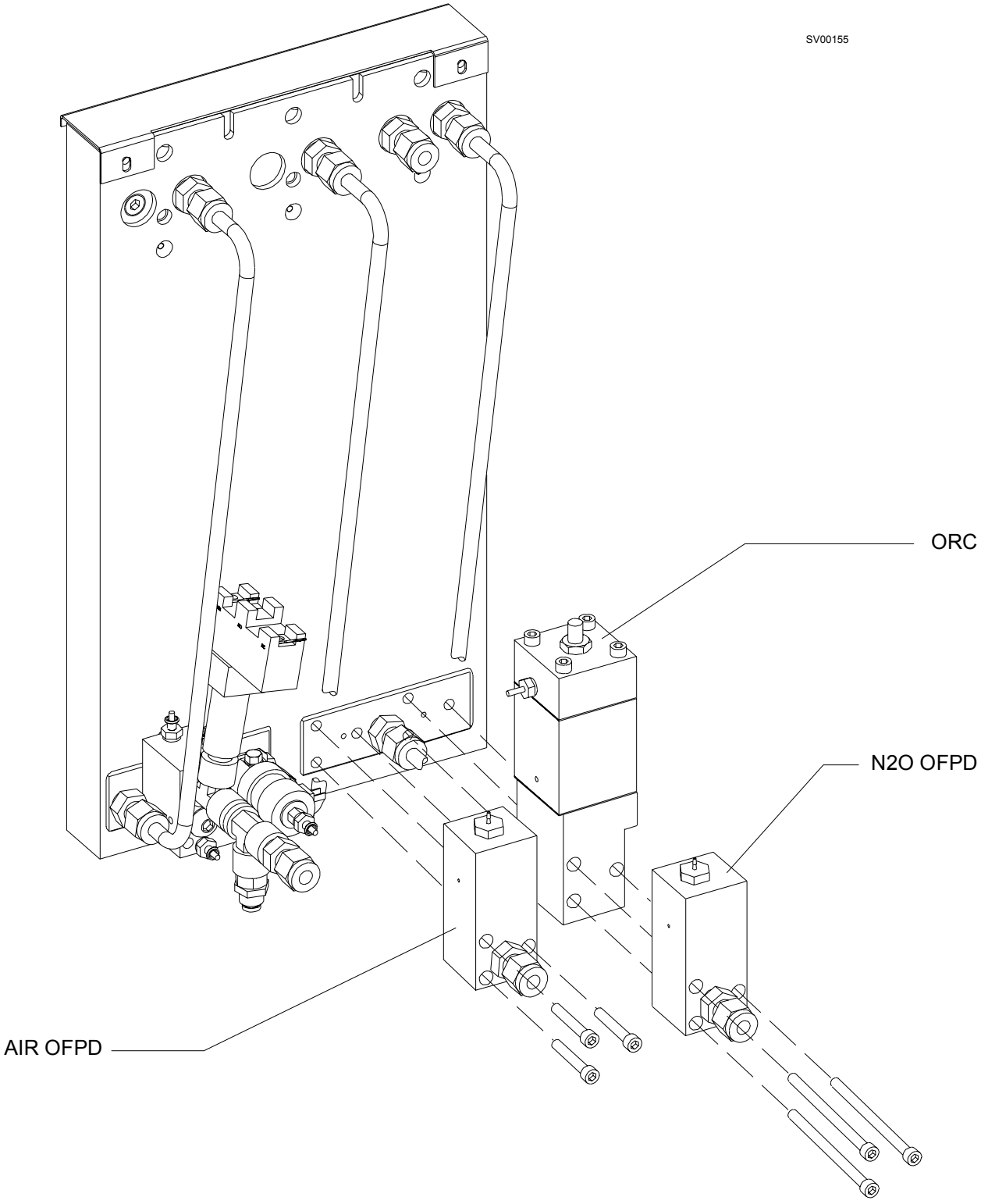


Figure 4-8. OFPD Replacement

4.8.14 Reconnect the copper tube to the OFPD.

4.8.15 Return the gas analyzer pod (and any other pod) to its original position, and tighten its captive mounting screw.

4.8.16 Reinstall the flowmeter housing back cover.

4.8.17 Reconnect the pipeline hoses.

4.8.18 Perform the PMC Procedure given in Section 6.

4.9 Oxygen Supply Pressure Alarm Switch

The oxygen supply low pressure alarm switch is located on the back of the O_2 block in the flowmeter housing. Access to the switch requires removal of the flowmeter housing back cover. Tubing and electrical connections are shown in Figure 4-9.

4.9.1 Disconnect all pipeline hoses and close all cylinder valves.

4.9.2 Press the O_2 Flush valve to drain oxygen pressure from the system.

4.9.3 Turn the System Power switch to STANDBY. Disconnect AC power from the machine and pull all circuit breakers to their 'out' position.

4.9.4 Remove the flowmeter housing back cover.

4.9.5 Loosen the captive mounting screw on the gas analyzer pod and slide the pod outward to gain better access to the flowmeter housing. Do the same for any other pod projecting inside the flowmeter housing.

4.9.6 Disconnect the wire harness from the switch terminals.

4.9.7 Disconnect the wire harness from the minimum flow cutoff solenoid.

4.9.8 Disconnect the copper O_2 supply tube at the back T-fitting behind the O_2 block on the flowmeter sub-assembly.

4.9.9 Disconnect the ventilator O_2 supply flexible tube from the bottom port on the T-fitting.

4.9.10 Disconnect the flexible tubes from the hose barbs on the OFPDs and the ORC.

4.9.11 Remove the three screws securing the O_2 block to the flowmeter sub-assembly, and remove the block with the T-fittings and O_2 supply pressure switch attached.

4.9.12 Remove the O_2 supply pressure switch from the front T-fitting. Carefully remove any sealing tape remnants from the threads in the T-fitting.

4.9.13 Install the replacement O_2 supply pressure switch with new sealing tape, making sure that the switch is oriented like the original.

4.9.14 Ensure that the O-ring is installed correctly, and reinstall the O_2 block assembly.

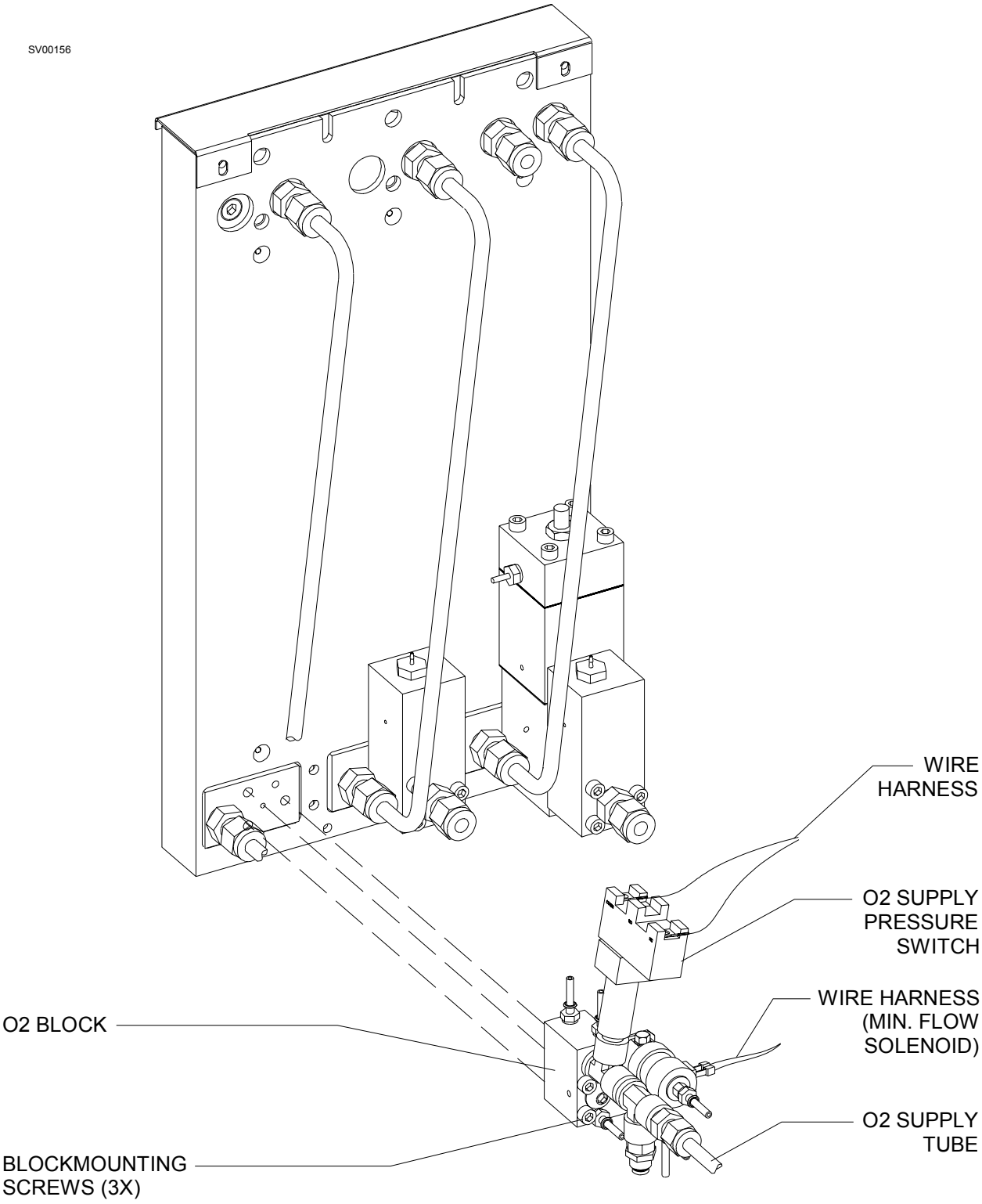


Figure 4-9. Oxygen Supply Pressure Alarm Switch

4.9.15 Reconnect the flexible tubes to the ORC and to each OFPD. Secure each connection with a press-on hose clamp.

4.9.16 Reconnect the copper O_2 supply tube at the T-fitting.

4.9.17 Reconnect switch wire harness, and the solenoid wire harness.

4.9.18 Locate the O_2 pressure test port. Remove the plug from the port and connect a test gauge.

4.9.19 Restore AC power to the machine and enable the circuit breakers.

4.9.20 Open an oxygen cylinder valve and turn the System Power switch to ON.

4.9.21 Set the oxygen flow to 5 L/min./

4.9.22 Close the oxygen cylinder valve.

4.9.23 As the pressure drops, the O_2 SUPPLY alarm should activate when the pressure is between 40 and 34 psi as shown in the test gauge.

4.9.24 If the alarm activates when the pressure is below 34 psi or above 40 psi, turn the adjustment wheel (see illustration), repeat the test and adjust as necessary to bring the set point into the correct range.

4.9.25 Turn the System Power switch to STANDBY.

4.9.26 Disconnect the test gauge and replace the plug in the test port.

4.9.27 Return the gas analyzer pod (and any other pod) to its original position, and tighten its captive mounting screw.

4.9.28 Reinstall the flowmeter housing back cover.

4.9.29 Reconnect the pipeline hoses.

4.9.30 Perform the PMC Procedure given in Section 6.

4.10 Oxygen Ratio Controller

The oxygen ratio controller (ORC) is attached to the N_2O flowmeter sub-assembly. Access to the ORC requires removal of the flowmeter housing back cover, and removal of the N_2O OFPD assembly. The ORC mounting and connection arrangement is shown in Figure 4-10.

4.10.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

4.10.2 Close all cylinder valves except for one O_2 cylinder.

4.10.3 Set the oxygen flow to 5 liters per min.

4.10.4 Open the other gas flow control valves to drain pressure from the system.

4.10.5 Close the O_2 cylinder valve and the O_2 flow control valve. Press the O_2 Flush valve to drain oxygen pressure from the system.

4.10.6 Turn the System Power switch to STANDBY.

4.10.7 Remove the flowmeter housing back cover.

4.10.8 Loosen the captive mounting screw on the gas analyzer pod and slide the pod outward to gain better access to the flowmeter housing. Do the same for any other pod projecting inside the flowmeter housing.

4.10.9 Disconnect the copper tube at the back of the N_2O OFPD.

4.10.10 Disconnect the flexible tubing from the hose barb at the top of the OFPD.

4.10.11 Disconnect the flexible tubing from the hose barb at the top of the ORC.

NOTE: The N_2O OFPD has long mounting screws, which pass through the oxygen ratio controller (ORC) and into the flowmeter sub-assembly. These screws retain both devices.

4.10.12 Remove the three screws securing the OFPD and the ORC to the flowmeter sub-assembly. Remove the OFPD and the ORC.

4.10.13 Position the replacement ORC at the back of the N_2O flowmeter sub-assembly; be sure that its O-rings are in place. Reinstall the OFPD, with the mounting screws going through the ORC and into the flowmeter sub-assembly. Tighten the screws.

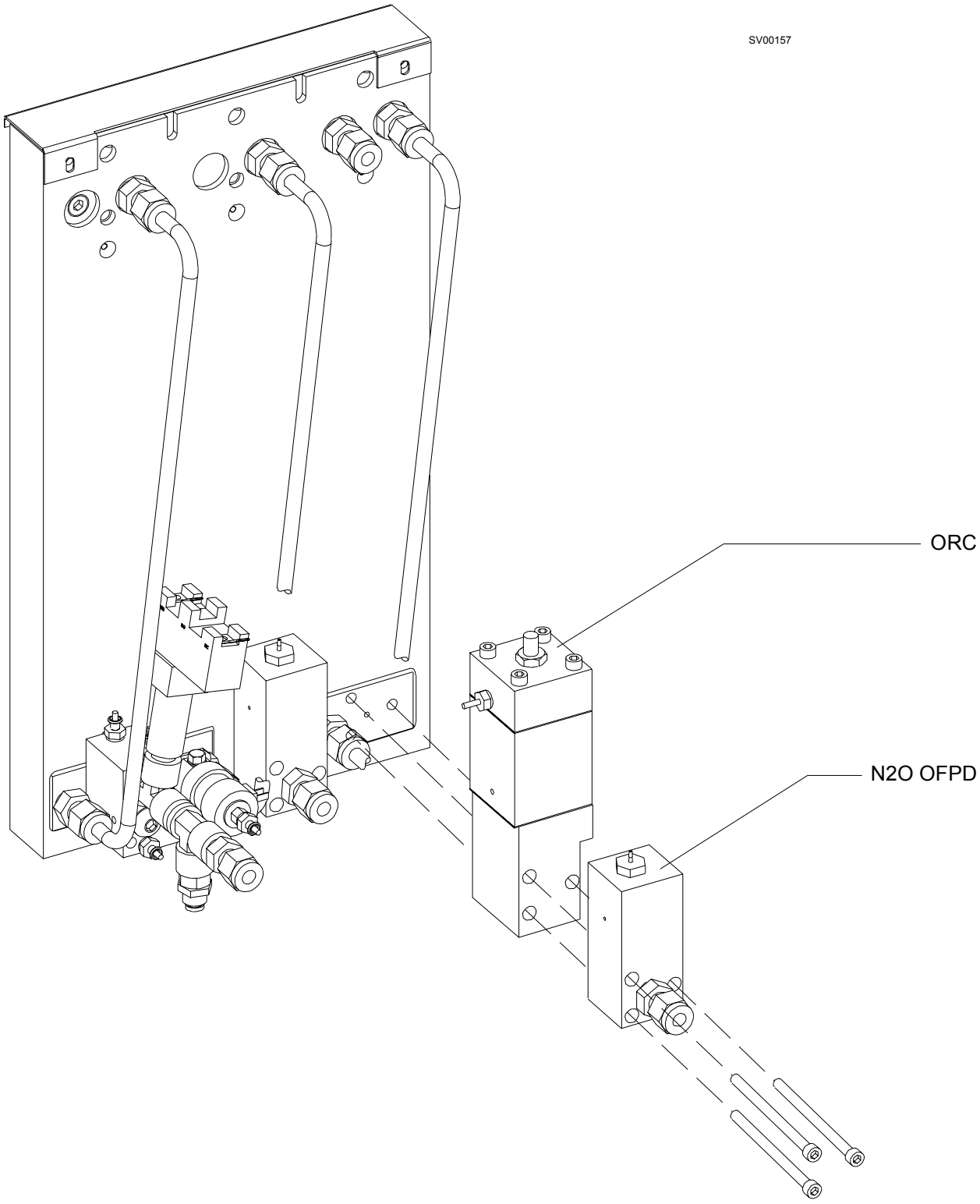


Figure 4-10. Oxygen Ratio Controller

4.10.14 Reconnect the flexible tubing to the ORC and the OFPD. Secure each connection with a press-on hose clamp.

4.10.15 Reconnect the copper tube to the N_2O OFPD.

4.10.16 Reconnect the pipeline supplies.

4.10.17 Perform the ORC adjustment procedure given in Section 5 of this manual.

4.10.18 Return the gas analyzer pod (and any other pod) to its original position, and tighten its captive mounting screw.

4.10.19 Reinstall the flowmeter housing back cover.

4.10.20 Perform the PMC Procedure given in Section 6.

4.11 O2 Flush Valve

The O_2 Flush valve is located at the left side of the front bumper in a housing joined to the bag pole. The rear cover of the housing is removable for access to the valve. The mounting and tubing arrangement for the valve is shown in Figure 4-11.

4.11.1 Turn the System Power switch to STANDBY.

4.11.2 Disconnect all pipeline hoses.

4.11.3 Close the O_2 cylinder valve.

4.11.4 Press the O_2 Flush valve to drain oxygen pressure from the system.

4.11.5 Remove the rear cover from the O_2 Flush valve housing.

4.11.6 Remove the O_2 Flush button. Its set screws are accessible through holes in the guard ring.

4.11.7 Insert a rod or hex wrench through the holes in the guard ring (or use a spanner wrench), and un-screw the guard ring from the threaded neck of the valve while holding the valve from the back with an open end wrench.

4.11.8 Pull the valve from the back of the housing and disconnect the flexible tubing.

4.11.9 Using Loctite as specified in the illustration, assemble the fittings into the replacement valve.

4.11.10 Connect the tube with two O2 labels to the lower valve fitting, and the tube with the single O2 label to the upper valve fitting. Then position the valve in the housing.

4.11.11 Using Loctite, secure the valve in the housing with the guard ring. Reinstall the flat washer, then secure the O_2 Flush button. Make sure both set screws are tight.

4.11.12 Reinstall the rear cover on the O_2 Flush valve housing.

4.11.13 Disconnect the breathing system hose from the fresh gas outlet and perform the following test:

4.11.13.1 Open the oxygen cylinder valve.

4.11.13.2 Connect a test volumeter to the fresh gas outlet, and reset the volumeter to zero.

4.11.13.3 Press the O_2 Flush button and observe the flow rate. It should be between 45 and 65 L/min.

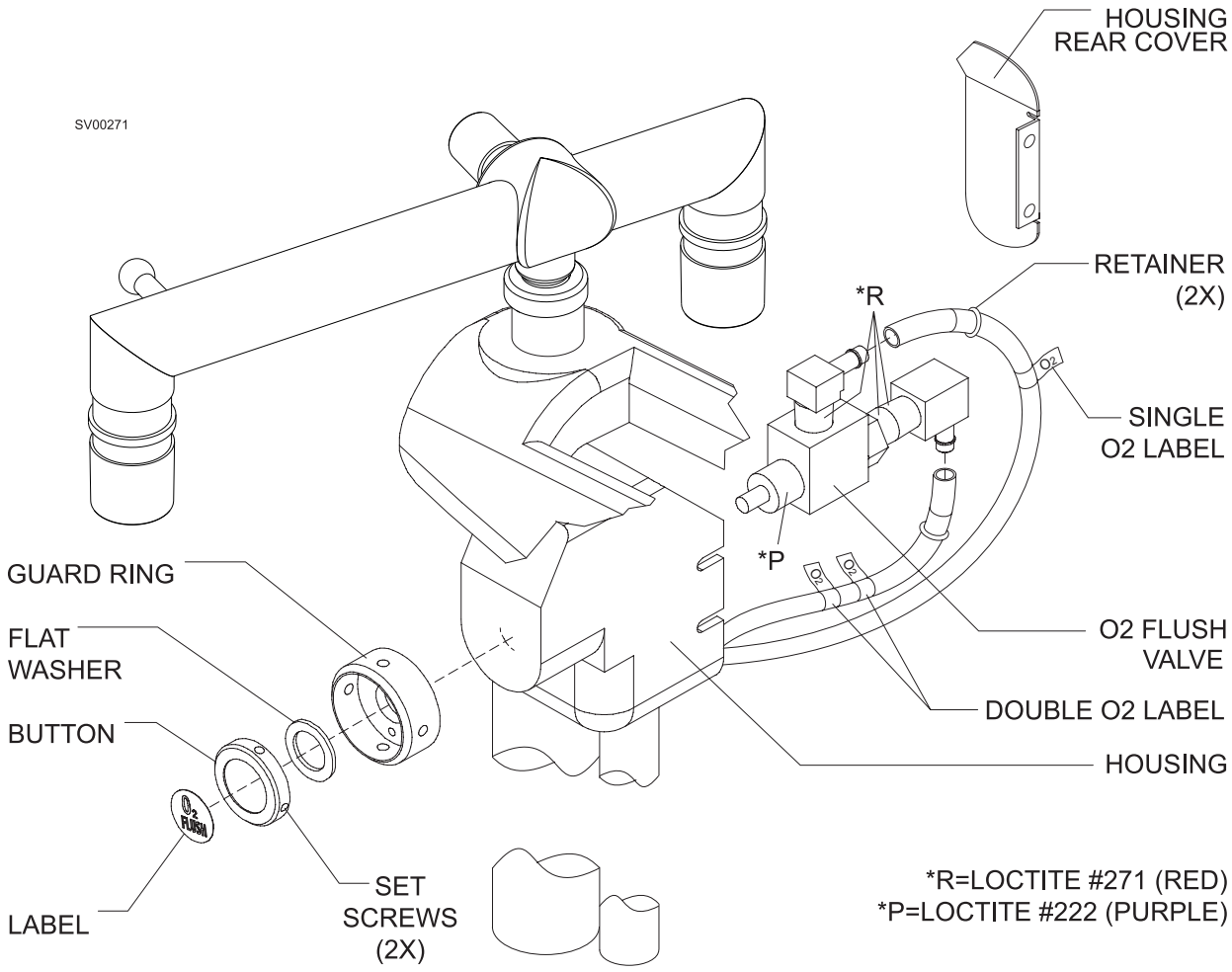


Figure 4-11. O_2 Flush Valve Assembly

4.11.13.4 Disconnect the volumeter from the fresh gas outlet.

4.11.14 Reconnect the breathing system hose to the fresh gas outlet.

4.11.15 Connect the pipeline hoses.

4.11.16 Perform the PMC procedure given in Section 6.

4.12 Ventilator Piston-Cylinder Diaphragm Replacement

The piston-cylinder unit is part of the Divan ventilator and is located directly below the hinged top of the ventilator chassis. The unit contains two roller diaphragm seals. The following instructions include a replacement procedure for the front (patient side) and rear diaphragm seals. The mechanical arrangement of the piston-cylinder unit is shown in Figure 4-12.

4.12.1 Turn the System Power switch to STANDBY (or switch the ventilator to Standby Mode).

4.12.2 Open the hinged top of the ventilator.

4.12.3 Turn the breathing system locking bar (¼ turn CCW) to unlock the release lever on the piston-cylinder unit. (This will also move the breathing system away from the patient gas port on the piston-cylinder unit to prevent damage to the lip seal when the piston-cylinder unit is removed.)

4.12.4 Pull the release lever on the piston-cylinder unit up, and using the lever as a handle, pull the piston-cylinder unit straight up and out of the ventilator.

NOTE: If the piston-cylinder unit can not be easily removed from the ventilator, contact DrägerService. The removal position of the drive unit may need to be re-adjusted.

4.12.5 Loosen the ¼ turn 6 mm quick-lock screws and remove the cylinder head from the unit.

4.12.6 Hold the piston, and loosen the 6 mm center screw securing the piston to the piston rod.

4.12.7 Remove the piston and the front diaphragm.

NOTE: Skip the next ten steps if you are replacing only the front diaphragm.

4.12.8 Remove the center nut (14 mm box or open end wrench) and spring washer securing the separator to the piston rod. Place an allen wrench through the hole in the piston rod to keep the rod from turning while unscrewing the nut.

4.12.9 Remove the two screw-nuts from the back plate using a forked, slotted driver tool P/N 7900864.

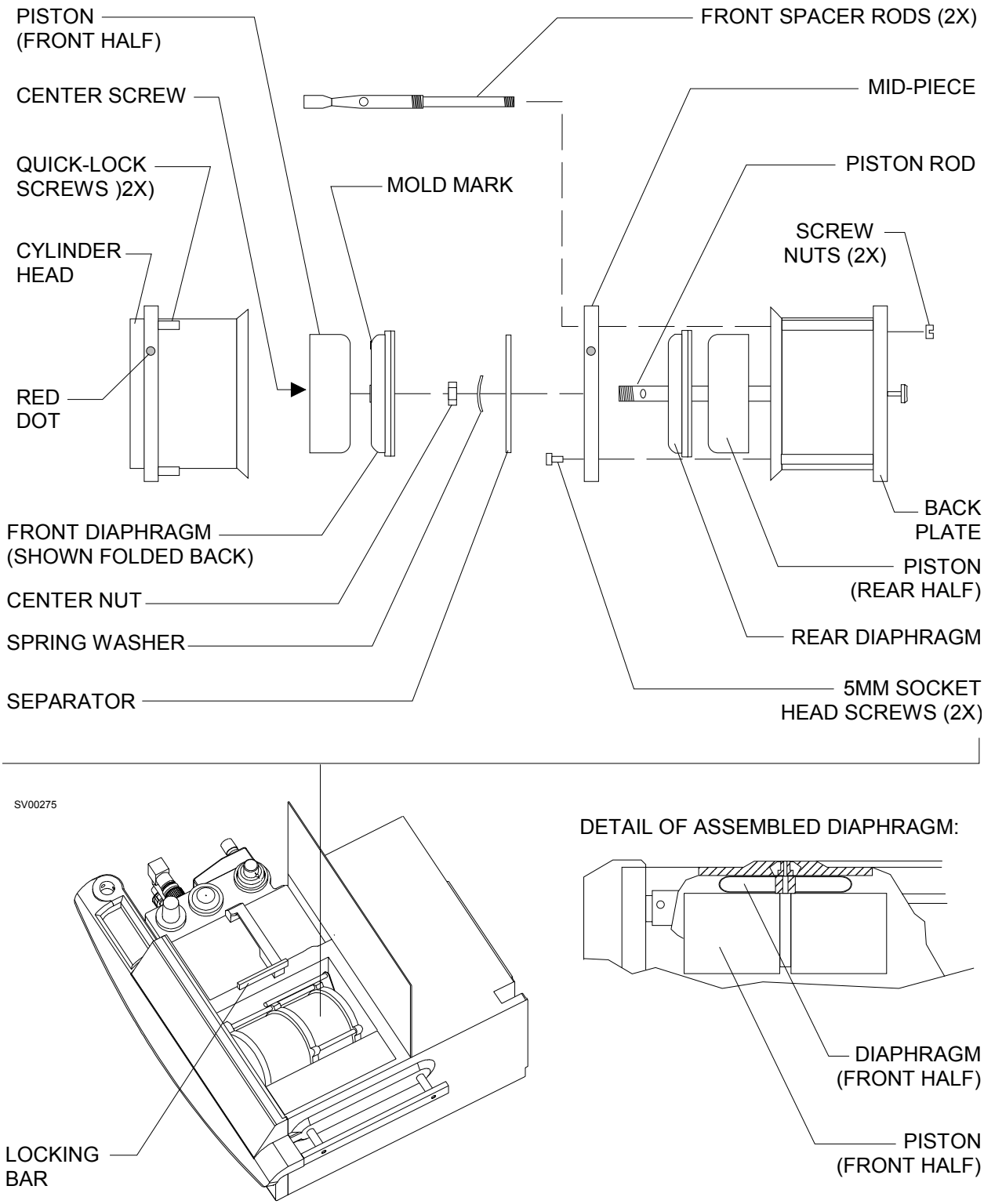


Figure 4-12. Piston-cylinder unit diaphragm replacement

4.12.10 Orient the piston-cylinder unit so that the red dot on the mid-piece is facing up. Using a pencil, draw an arrow next to the red dot pointing toward the front of the piston-cylinder unit. This will help you to correctly orient the mid-piece when the unit is re-assembled.

4.12.11 Remove the two 5 mm socket head screws from the front of the mid-piece.

CAUTION: Take care not to damage the diaphragm with the allen wrench in the next step.

4.12.12 Unscrew the two front spacer rods from the mid-piece and withdraw them from the piston-cylinder unit. (These rods also pass through the rear spacers.) Place an allen wrench through the hole in each rod in order to turn it.

4.12.13 Remove the mid-piece and set it aside.

4.12.14 Un-screw the separator from the piston rod by turning the piston. Place an allen wrench through the hole in the piston rod to keep the rod from turning while unscrewing the separator.

The rear diaphragm can now be removed from the rear half of the piston.

4.12.15 Fit the replacement diaphragm over the rear piston half (with the mold mark toward the piston). Screw the separator onto the piston rod and tightly against the diaphragm, and reinstall the spring washer and center nut. Place an allen wrench through the hole in the piston rod to keep the rod from turning while tightening the nut.

Carefully fit the diaphragm to the edge of the cylinder around its circumference.

4.12.16 Orient the mid-piece correctly (red dot on top, arrow pointing forward) and place it carefully against the diaphragm. Make sure the diaphragm fits properly around its circumference.

Reinstall the 5 mm socket head screws (do not tighten them) to hold the mid-piece in place.

CAUTION: Take care not to damage the diaphragm in the next step.

4.12.17 Reinstall the front spacer rods, making sure that they go through the rear spacers, and that the rear spacers are seated properly. Tighten the front spacer rods securely.

4.12.18 Tighten the 5 mm socket head screws, and reinstall the two screw-nuts on the back plate.

4.12.19 Install the replacement front diaphragm with its mold mark facing the front of the piston-cylinder unit as shown in the illustration. Assemble the diaphragm and piston in the same manner as the original, and reattach the piston to the piston rod by tightening the center 6 mm screw. Bring the diaphragm forward over the piston.

NOTE: the diaphragm must form a neat U-fold as shown in the illustration detail when the cylinder head is replaced in the next step.

4.12.20 As you reinstall the cylinder head, carefully fit the diaphragm to the edge of the cylinder around its circumference, and secure the cylinder head with the ¼ turn quick-lock screws. Ensure that the cylinder head is oriented correctly (the red dot should be on top) with its breathing system port on the left as you face the front of the piston-cylinder unit.

4.12.21 Reinstall the piston-cylinder unit: holding it by the release lever - lower it into the ventilator chassis until it is properly seated and the piston rod is correctly engaged in the drive unit.

4.12.22 Fold down the release lever and turn the breathing system locking bar (¼ turn CW) to lock the piston-cylinder unit in place.

4.12.23 Start the ventilator in Service Mode by holding down the two hidden keys on the ventilator control panel (see Section 2, Diagnostics) and turning the System Power switch to ON.

4.12.24 Turn the knob on the ventilator control panel to display MOVE PISTON, and press the knob.

4.12.25 Turn the knob to move the piston over its full stroke: verify that the piston and diaphragm seals are moving correctly.

4.12.26 Turn the System Power switch to STANDBY.

4.12.27 Perform the PMC Procedure given in Section 6.

4.13 Divan Ventilator PCB Assemblies, Battery and EPROM Replacement

Replacement procedures are divided into the following sub-sections:

4.13.1 3.6 V lithium battery P/N 1817582 replacement on CPU 1

4.13.2 CPU 1 P/N 8200994, 8305141 replacement

4.13.3 CPU 2 P/N 8305664, 8200990 replacement

4.13.4 ADDA P/N 8200974, 8200970 replacement

4.13.5 Divan Software Upgrade Kit 7.40 P/N 4117024, E-PROM P/N 4116983-001 on CPU 1 and E-PROM P/N 4116983-002 on CPU 2

4.13.6 9.0 V nicad battery P/N 8301856 replacement on motherboard

Access to the ventilator electronics assembly is needed for PCB replacement, E-PROM updates, and periodic battery replacement. The 9 V battery on the motherboard is replaced every three years. The 3.6 V lithium battery on CPU 1 as identified by a label on the PCB header connection P/N 8305141 is replaced each year or sooner as indicated on the battery “Replace By:” label, or every 6 years if PCB is identified as P/N 8604032.

4.13.1 3.6v Lithium Battery P/N 1817582 Replacement on CPU 1

NOTE: The 3.6v lithium battery is electrically connected to CPU1 via a blue two-pin shunt or solder bridge on the small vertically mounted PCB located near the battery. When the battery is electrically connected to CPU1 it has a one-year service life from the date of installation. A new process is being implemented that will place an identifying label on the battery to indicate the battery’s required replacement by date.

CAUTION: Replacement of the lithium battery on CPU1 requires de-soldering and re-soldering at the PCB level. Only service personnel with advanced soldering capabilities shall attempt to perform this procedure.

4.13.1.1 Turn the System power switch to STANDBY.

4.13.1.2 Disconnect the AC power from the machine and pull all circuit breakers to their ‘out’ position.

CAUTION: Use ESD precautions when handling any of the Divan electronics assemblies. These boards contain static sensitive components.

4.13.1.3 Raise the Divan tabletop cover to its open position.

4.13.1.4 Remove the cover plate at the right side of the Divan assembly.

4.13.1.5 Identify the extreme right location of CPU1 PCB and its battery. Refer to Figure 4-13.

NOTE: CPU1 PCB is identified as CPU - STANDARD 2

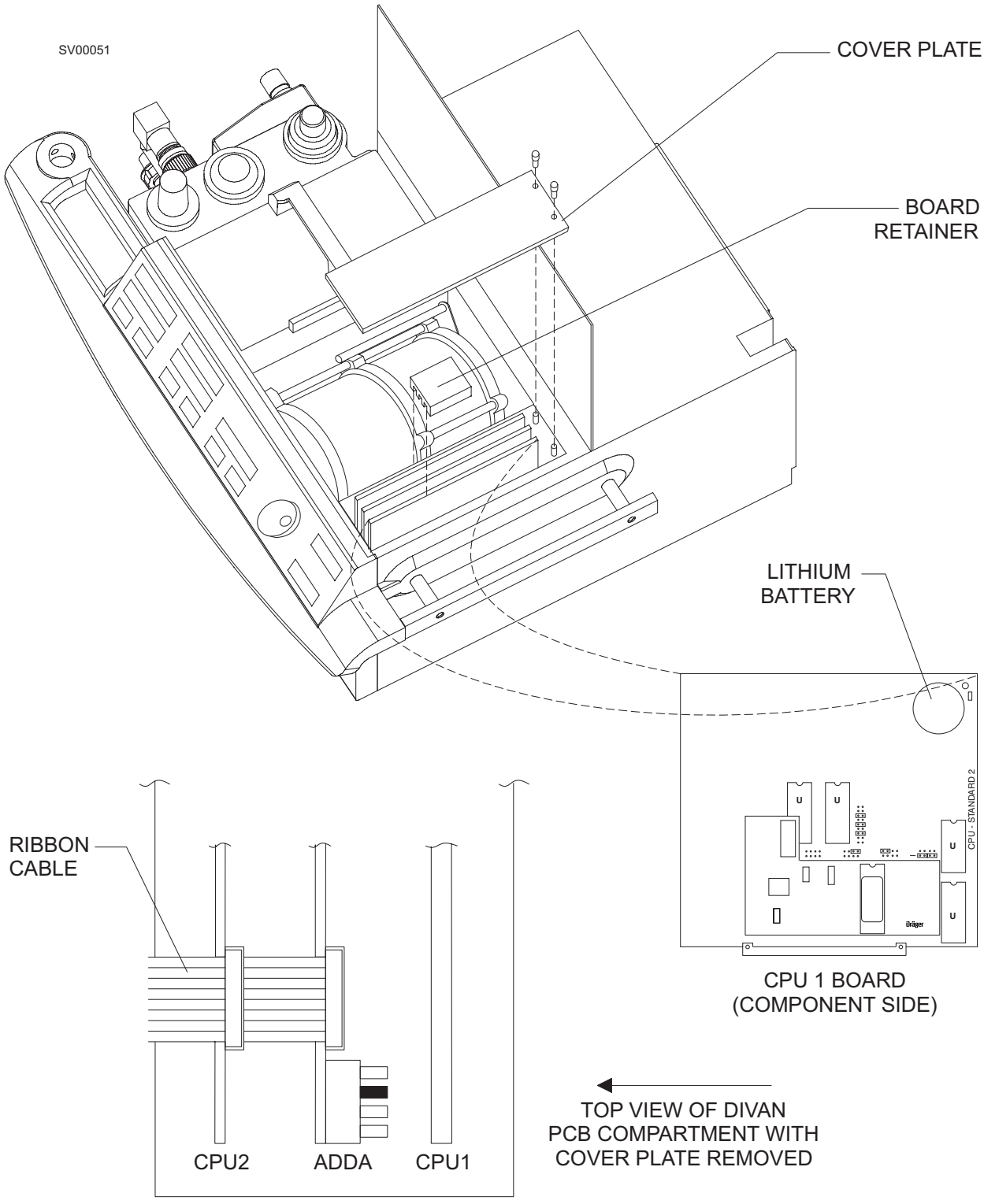


Figure 4-13. Location of PCB Assemblies and 3.6 V Lithium Battery

4.13.1.6 If the battery replace by label date indicates less than 3-months from the current date, the battery must be replaced. Skip to step 4.13.1.9.

If the battery does not contain a replace by label on the battery, then the required replacement interval must be established. Remove the PCB board retainer. Carefully unplug CPU1 from the motherboard by raising it straight up and out of its retainer. Compare the alphanumeric serial number printed on the PCB's header connector. Refer to the serial number chart on attachment 1. If CPU1 indicates that its date of manufacture is greater than 9 months from the current date, the battery must be replaced, (after recording the Divan's Operating Hours, Total Hours and Error Code information). Skip to step 4.13.1.7.

If the battery's 'replace by' label date indicates 3 months or greater from the current date, the battery is not due for replacement. Reinstall the cover plate over the PCB boards. Restore AC power to the machine and enable the circuit breakers. Inspection is complete.

4.13.1.7 Reinstall CPU1 PCB into the extreme right location making sure it's fully seated into the motherboard and install the PCB board retainer on the top of the circuit boards.

4.13.1.8 Restore AC power to the machine and enable the circuit breakers.

4.13.1.9 Start the Divan in Service Mode by pressing the left pad of the STANDBY button and the pad above it, while turning the System power switch to ON. Rotate the knob to display LOGBOOK and press the knob. Review the last ten logbook entries, then press the knob to exit the function.

4.13.1.10 Rotate the knob to select TOTAL HOURS. Press the knob and record the hours shown on the 7-segment display for Vt and rate for future reference. Press the knob to exit the function. Turn the knob to display OPERATING HOURS. Press the knob and record the hours shown on the 7-segment display for Vt and rate for further reference. Press the knob to exit the function.

4.13.1.11 Turn the System Power switch to STANDBY. Disconnect AC power from the machine and pull all circuit breakers to their 'out' position.

4.13.1.12 Remove the PCB board retainer.

4.13.1.13 Carefully unplug the CPU1 from the motherboard by raising it straight up and out of its retainer.

4.13.1.14 Locate the small vertically mounted PCB near the battery (see detail in Figure 4-13B).

4.13.1.15 Determine if the PCB contains a removable jumper or a solder bridge. If it has a jumper, remove and discard it. If it has a solder bridge, open the solder bridge.

CAUTION: Use only soldering iron with a grounded tip.

4.13.1.16 Before unsoldering the battery, note its orientation and polarity on the CPU1 board. Carefully install the replacement battery in the same manner.

4.13.1.17 On CPU1 close the solder bridge on the small vertically mounted PCB located near the battery.

4.13.1.18 Record the current month plus one year from the current year on the battery Replace By: label p/n 4116949 and affix this label to the side wall of the battery on the side opposite to the PCB's header connector.

4.13.1.19 Reinstall CPU1 PCB into the extreme right location making sure it's fully seated into the motherboard and install the board retainer on the top of the circuit boards.

4.13.1.20 Restore AC power to the machine and enable the circuit breakers.

4.13.1.21 Start the Divan on Service Mode by pressing and holding the left pad of the Standby button and the pad above it while turning the System Power switch to ON. Press the rotary knob then rotate it two selections to the right to display **select lang.** (Sprachauswahl). Verify and or make the following adjustments.

Note: Faults Nr. 7, 9, 12, or 21 (Stöung Nr. 7, 9, 12, 21) may be encountered and are normal immediately upon power-up after CPU1 battery replacement or CPU1 battery jumper installation.

Select Language: Press the rotary dial, select US. Version 07.xx. Press the rotary knob to exit the function.

Removal Position: Turn the rotary knob to display **removal pos.**, then press the knob to confirm. The screen will display **Adjust Piston**, then starting with the left side of the bar graph half lit, turn the rotary knob to move the illuminated bar graph one segment to the left. Unlatch the Breasy and attempt to remove, then install the piston cylinder. Repeat this process until the piston begins to be difficult to remove, then note this location on the bar graph display. Now starting with the left side of the bar graph half lit, turn the rotary knob to move the illuminated bar graph one segment to the right and attempt to remove then install the piston cylinder. Repeat this process until the piston begins to be difficult to remove, then note this location on the bar graph display. Determine the algebraic mean of the two extreme reference points, then turn the rotary knob until the bar graph LED indicates this value. Confirm the piston cylinder unit can be easily removed and installed. Close the latch on the Breasy. Press the rotary knob to exit the function.

Select System: Turn the rotary knob to display **Select System**, then press the knob to confirm selection. Turn the rotary knob to select **Cicero EM**, then press the knob to confirm. Press the rotary knob to exit the function.

Total Hours: Using a non-conductive tool, set the third DIP switch on the ADDA PCB to the down position. Turn the rotary knob to display **Total Hours**, then press the knob to confirm selection. Reenter the total hours information as follows:

Rate key increments the 10,000 digit (range 0-2)
I:E key increments the 1,000 digit (range 0-9 or 0-5)
% I.P./Flow increments the 100 digit (range 0-9)
PEEP increments the 10 digit (range 0-9)
SIMV Rate increments 1 digit (range 0-9)

Note: If the value is zero the LED segment remains blank. If the 10,000 digit is set to 2 then the 1,000 and 100 digits can only be altered in the range of 0-5.

Press the Pmax key to enter the displayed value to memory.

Press the rotary knob to exit the function.

Operating Hours: Turn the rotary knob to display **Operating Hours**, then press the knob to confirm selection. Press the Pmax key to allow information to be changed as follows:

Rate key increments the 10,000 digit (range 0-2)
I:E key increments the 1,000 digit (range 0-9 or 0-5)
% I.P./Flow increments the 100 digit (range 0-9 or 0-5)
PEEP increments the 10 digit (range 0-9)
SIMV Rate increments 1 digit (range 0-9)

Note: If the value is zero the LED segment remains blank. If the 10,000 digit is set to 2 then the 1,000 and 100 digits can only be altered in the range of 0-5.

Press the Pmax key to enter the displayed value to memory.

Press the rotary knob to exit the function.

Select Parameter: Turn the rotary knob to display **Select Parameter**, then press the knob to confirm selection. The display will then indicate **Default Settings**. Refer to the chart listed below and touch each key to display the current default value. If a parameter requires adjustment, rotate the knob to make to the correct setting.

Parameter	Setting
Pmax	25 @ Software Version 7.13
Pmax	30 @ Software Version 7.40
I:E	1.0 : 2.0

Press the rotary knob twice to exit the function.

Display Config: Rotate the knob to show **display config.,** then press the knob to confirm selection. Scroll the knob to display, **Display ON** then press the knob to exit the function.

Confirm Mode: Turn the rotary knob to display **Confirm Mode**, then press the knob to confirm selection. Turn the rotary knob to select **Confirm R-Knob**, then press the knob to exit the function.

Cancel Test: (Applies only to 7.40 Divan Software) Turn the rotary knob to display **Cancel Test**, then press the knob to confirm selection. Turn the rotary knob to select **Limited,** then press the knob to confirm. Press the rotary knob to exit the function.

4.13.1.22 Turn the knob to select **log book**, then press the knob.

4.13.1.23 Press the Pmax key to reset the display to [0000] 000 00H.

4.13.1.24 Using a non-conductive tool, return the 3rd DIP switch to its original (up) position.

4.13.1.25 Turn the System power switch to STANDBY.

4.13.1.26 Reinstall the cover plate over the PCB boards, (at the completion of the PMC).

4.13.1.27 Turn the System Power switch to Standby, then to ON and verify that the ventilator successfully completes its self-test routine.

4.13.1.28 Enter the parts usage in the replacement parts service menu.

4.13.1.29 Perform the PMC procedure given in Section 6 of the Narkomed 6000 Technical Service Manual.

4.13.2 CPU1, (CPU Standard 2) p/n 8200994, 8305141, 8604038 Replacement

NOTE: The 3.6v lithium battery is electrically connected to CPU1 via a blue two-pin shunt or solder bridge on the small vertically mounted PCB located near the battery. When the battery is electrically connected to CPU1 (P/N 8200994 or 8305141) it has a one-year service life from the date of installation. Part No. 8604038 has a six year service life from date of installation. The identifying part number is printed on a label on the header connector of CPU1. A new process is being implemented that will place an identifying label on the battery to indicate the battery's 'replace by' date. If the battery's replace by date has not been previously defined, the battery must be replaced if the alphanumeric serial number printed on a label on the header connector of CPU1 indicates that it is greater then 9 months old. Refer to the serial number reference chart (Figure 4-13A) and also to Section 4.13.1 if the battery requires replacement.

CAUTION: Replacement of CPU1 requires soldering at the PCB level. Only service personnel with advanced soldering capabilities shall attempt to perform this procedure.

CAUTION: the firmware E-PROMs used in the Divan ventilator are installed as a set of components on CPU1 daughter PCB and CPU2 PCB. As such the software versions must be identical.

4.13.2.1 Turn the System power switch to STANDBY. Start the Divan in Service Mode by pressing the left pad of the STANDBY button and the pad above it, while turning the System power switch to ON. Rotate the knob to display LOGBOOK and press the knob. Review the last ten logbook entries, then press the knob to exit the function.

4.13.2.2 Rotate the knob to select TOTAL HOURS. Press the knob and record the hours shown on the 7-segment display for Vt and rate for future reference. Press the knob to exit the function. Turn the knob to display OPERATING HOURS. Press the knob and record the hours shown on the 7-segment display for Vt and rate for further reference. Press the knob to exit the function.

4.13.2.3 Turn the System Power switch to STANDBY.

4.13.2.4 Disconnect AC power from the machine and pull all circuit breakers to their 'out' position.

CAUTION: Use ESD precautions when handling any of the Divan electronics assemblies. These boards contain static sensitive components.

4.13.2.5 Raise the Divan tabletop cover to its open position.

4.13.2.6 Remove the cover plate at the right side of the Divan assembly.

4.13.2.7 Remove the board retainer.

4.13.2.8 Identify the extreme right location of PCB1. Refer to Figure 4-13.

Serial Number System

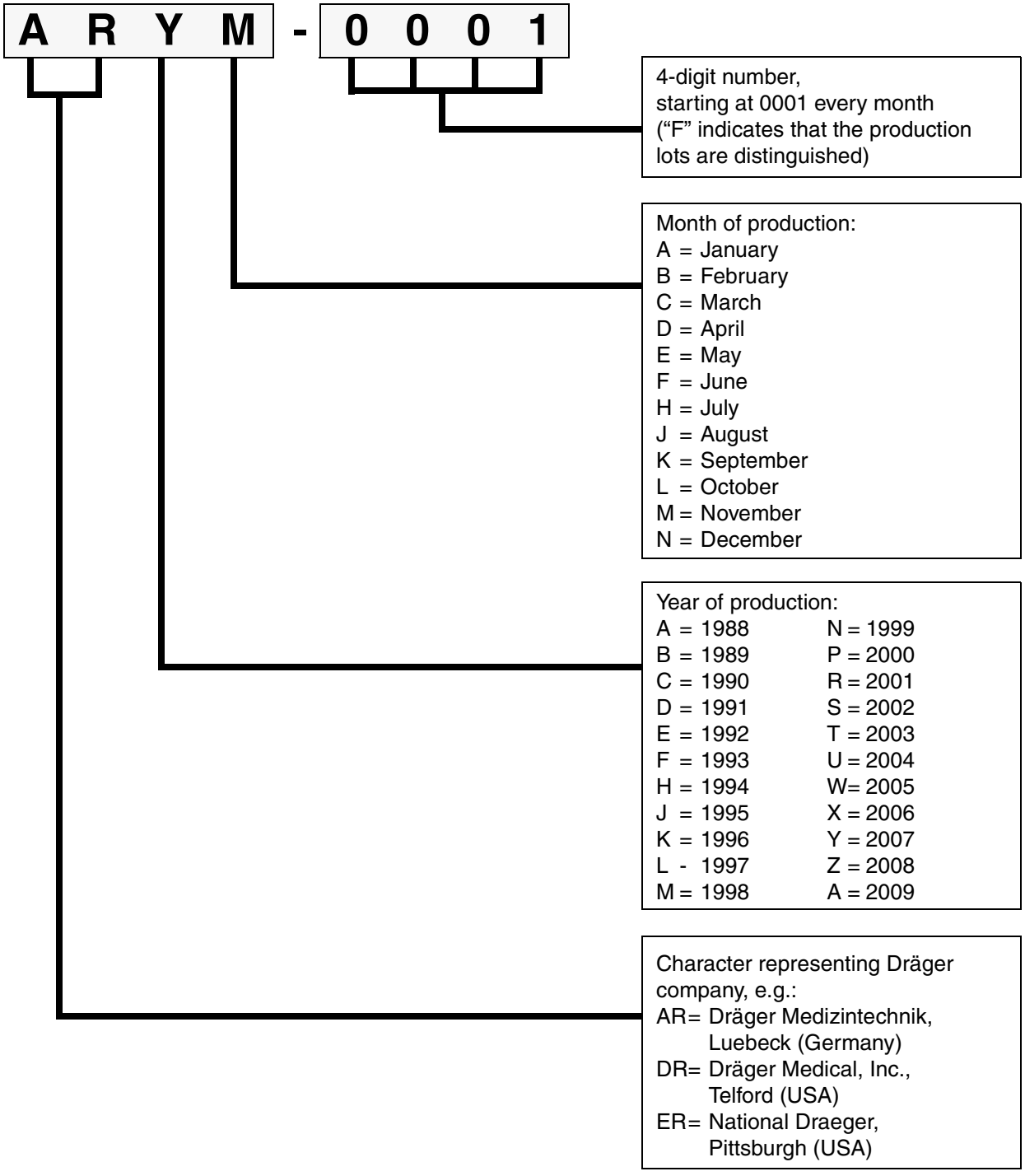


Figure 4-13A. Serial Number Reference Chart

NOTE: CPU1 PCB is identified as CPU- STANDARD 2; CPU2 PCB contains a 7-segment LED and is identified as LP-CPU.

4.13.2.9 Carefully unplug the PCB from the motherboard by raising it straight up and out of its retainer. If you are installing P/N 8604038, skip the next three steps.

4.13.2.10 On the replacement CPU1 subassembly, locate the solder bridge pads on the small vertically mounted PCB (see detail in Figure 4-13B). Apply solder across these pads. DO NOT use the jumper to enable the battery.

CAUTION: Use only soldering iron with a grounded tip.

4.13.2.11 On the replacement CPU1 subassembly, locate the blank battery Replace By: label p/n 4116949 the on the side wall of the battery and record the current month plus one year from the current year on the label. If the replacement CPU1 does not already contain this label, perform the lithium battery replacement procedure in Section 4.13.1.

4.13.2.12 Remove the daughter PCB with E-prom (E-PROM board) from the original unit. Using an IC extraction tool, remove the four ICs (Marked U1 thru U4 in Figure 4-13B) from the original board. With an IC insertion tool carefully transfer the IC's to the replacement PCB. Pay particular attention to the correct location and orientation of the IC components. The notch in each IC must correspond with the notch in the board socket. Remove and discard the jumper near the battery marked D in Figure 4-13B. Transfer the eight remaining jumpers marked J in Figure 4-13B (ref. P/N 1814508), and the daughter board from the original to the new PCB and ensure the daughter board is properly aligned and fully seated in to the sockets. See Figure 4-13B.

4.13.2.13 Insert the replacement PCB into the extreme right motherboard location. Be certain the PCB is properly aligned and fully seated into the socket.

4.13.2.14 Reinstall the board retainer over the PCB boards.

4.13.2.15 Restore AC power to the machine and enable the circuit breakers.

4.13.2.16 Start the Divan on Service Mode by pressing and holding the left pad of the Standby button and the pad above it while turning the System Power switch to ON. Press the rotary knob then rotate it two selections to the right to display **select lang,** (Sprachauswahl). Verify and or make the following adjustments.

Note: Faults Nr. 7, 9, 12, or 21 (Stöung Nr. 7, 9, 12, 21) may be encountered and are normal immediately upon power-up after CPU1 battery replacement or CPU1 battery jumper installation.

IC Identification Markings:

U1: R6551P R6551-11 9533
U2: MC68B40CP 00GG6 CT CT BD9644
U3: MC146818P 00GC6 QLEN9620
U4: SANYO LC 356 4S-10 Japan 7JDOG

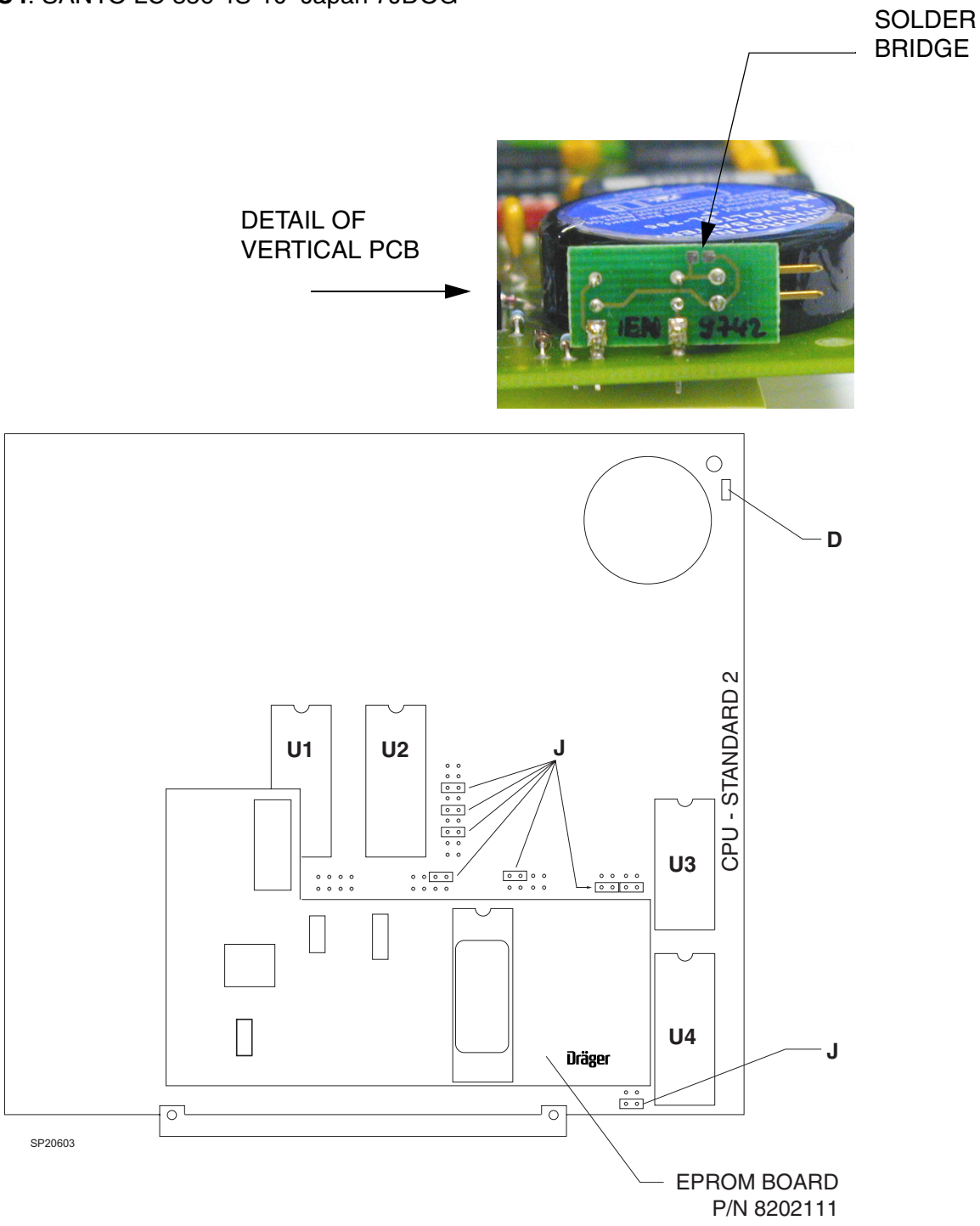


Figure 4-13B. Location of EPROMs and Jumpers on CPU

Select Language: Press the rotary dial then, select US. Version 07.xx. Press the rotary knob to exit the function.

Removal Position: Turn the rotary knob to display **removal pos.**, then press the knob to confirm. The screen will display **Adjust Piston**, then starting with the left side of the bar graph half lit, turn the rotary knob to move the illuminated bar graph one segment to the left. Unlatch the Breasy and attempt to remove, then install the piston cylinder. Repeat this process until the piston begins to be difficult to remove, then note this location on the bar graph display. Now starting with the left side of the bar graph half lit, turn the rotary knob to move the illuminated bar graph one segment to the right and attempt to remove then install the piston cylinder. Repeat this process until the piston begins to be difficult to remove, then note this location on the bar graph display. Determine the algebraic mean of the two extreme reference points then turn the rotary knob until the bar graph LED indicates this value. Confirm the piston cylinder unit can be easily removed and installed. Close the latch on the Breasy. Press the rotary knob to exit the function.

Select System: Turn the rotary knob to display **Select System**, then press the knob to confirm selection. Turn the rotary knob to select **Cicero EM**, then press the knob to confirm. Press the rotary knob to exit the function.

Total Hours: Using a non-conductive tool, set the third DIP switch on the ADDA PCB to the down position. Turn the rotary knob to display **Total Hours**, then press the knob to confirm selection. Reenter the total hours information as follows:

Rate key increments the 10,000 digit (range 0-2)
I:E key increments the 1,000 digit (range 0-9 or 0-5)
% I.P./Flow increments the 100 digit (range 0-9 or 0-5)
PEEP increments the 10 digit (range 0-9)
SIMV Rate increments 1 digit (range 0-9)

Note: If the value is zero the LED segment remains blank. If the 10,000 digit is set to 2 then the 1,000 and 100 digits can only be altered in the range of 0-5.

Press the Pmax key to enter the displayed value to memory.

Press the rotary knob to exit the function.

Operating Hours: Turn the rotary knob to display **Operating Hours**, then press the knob to confirm selection. Press the Pmax key to allow information to be changed as follows:

Rate key increments the 10,000 digit (range 0-2)
I:E key increments the 1,000 digit (range 0-9 or 0-5)
% I.P./Flow increments the 100 digit (range 0-9)
PEEP increments the 10 digit (range 0-9)
SIMV Rate increments 1 digit (range 0-9)

Note: If the value is zero the LED segment remains blank. If the 10,000 digit is set to 2 then the 1,000 and 100 digits can only be altered in the range of 0-5.

Press the Pmax key to enter the displayed value to memory.

Press the rotary knob to exit the function.

Select Parameter: Turn the rotary knob to display **Select Parameter**, then press the knob to confirm selection. The display will then indicate **Default Settings**. Referring to the chart listed below touch each key to display the current default value. If a parameter requires adjustment, rotate the knob to set the correct value.

Parameter	Setting
Pmax	25 @ Software Version 7.13
Pmax	30 @ Software Version 7.40
I:E	1.0 : 2.0

Press the rotary knob twice to exit the function.

Display Config: Rotate the knob to show **display config.,** then press the knob to confirm selection. Scroll the knob to display, **Display ON** then press the knob to exit the function.

Confirm Mode: Turn the rotary knob to display **Confirm Mode**, then press the knob to confirm selection. Turn the rotary knob to select **Confirm R-Knob**, then press the knob to exit the function.

Cancel Test: (Applies only to 7.40 Divan Software) Turn the rotary knob to display **Cancel Test**, then press the knob to confirm selection. Turn the rotary knob to select **Limited,** then press the knob to confirm. Press the rotary knob to exit the function.

4.13.2.17 Turn the knob to select **log book**, then press the knob.

4.13.2.18 Press the Pmax key to reset the display to [0000] 000 00H.

4.13.2.19 Using a non-conductive tool return the 3rd DIP switch to its original (up) position.

4.13.2.20 Reinstall the cover plate over the PCB boards, (at the end of the PMC).

4.13.2.21 Turn the System power switch to STANDBY, then to ON and verify that the ventilator successfully completes its self-test routine.

4.13.2.22 Enter the parts usage in the replacement parts service menu.

4.13.2.23 Perform the PMC procedure given in Section 6 of the Narkomed 6000 Technical Service manual.

4.13.3 CPU2, (LP-CPU) p/n 8305664, 8200990 Replacement

CAUTION: The firmware used in the Divan ventilator are installed as a set of components on CPU1 dauhter PCB and CPU2 PCB. As such the software versions must be identical.

4.13.3.1 Turn the System power switch to STANDBY. Start the Divan in Service Mode by pressing the left pad of the STANDBY button and the pad above it, while turning the System power switch to ON. Rotate the knob to display LOGBOOK and press the knob. Review the last ten logbook entries, then press the knob to exit the function.

4.13.3.2 Turn the System power switch to STANDBY.

4.13.3.3 Disconnect AC power from the machine and pull all circuit breakers to their 'out' position.

CAUTION: Use ESD precautions when handling any of the Divan electronics assemblies. These boards contain static sensitive components.

4.13.3.4 Raise the Divan tabletop cover to its open position.

4.13.3.5 Remove the cover plate at the right side of the Divan assembly.

4.13.3.6 Remove the board retainer.

4.13.3.7 Identify the extreme left location of the PCB2. Refer to Figure 4-13.

NOTE: CPU2 PCB contains a 7-segment LED and is identified as LP- CPU.

4.13.3.8 Remove the ribbon data cable from CPU2 and ADDA PCB's.

4.13.3.9 Carefully unplug the PCB from the motherboard by raising it straight up and out of its retainer.

4.13.3.10 Using an IC extraction tool, remove the E-Prom (see Figure 4-13C) from the original board. With an IC insertion tool carefully transfer the E-Prom to the replacement PCB. Pay particular attention to the correct pin alignment and orientation of the E-Prom. The notch in E-Prom must correspond with the notch in the board socket.

4.13.3.11 Insert the replacement PCB in the appropriate motherboard location. Be certain the PCB is fully seated in to the socket.

4.13.3.12 Reconnect the ribbon data cable to the ADDA and the CPU2 PCB's.

4.13.3.13 Reinstall the board retainer over the PCB boards.

4.13.3.14 Restore AC power to the machine and enable the circuit breakers.

4.13.3.15 Reinstall the cover plate over the PCB boards, (at the end of the PMC).

4.13.3.16 Turn the System power switch to STANDBY, then to ON and verify that the ventilator successfully completes its self-test routine.

4.13.3.17 Enter the parts usage in the replacement parts service menu.

4.13.3.18 Perform the PMC procedure given in Section 6 of the Narkomed 6000 Technical Service manual.

4.13.4 ADDA PCB p/n 8200974, 8200970 Replacement

4.13.4.1 Turn the System power switch to STANDBY. Start the Divan in Service Mode by pressing the left pad of the STANDBY button and the pad above it, while turning the System power switch to ON. Rotate the knob to display LOGBOOK and press the knob. Review the last ten logbook entries, then press the knob to exit the function.

4.13.4.2 Turn the System power switch to STANDBY.

4.13.4.3 Disconnect AC power from the machine and pull all circuit breakers to their 'out' position.

CAUTION: Use ESD precautions when handling any of the Divan electronics assemblies. These boards contain static sensitive components.

4.13.4.4 Raise the Divan tabletop cover to its open position.

4.13.4.5 Remove the cover plate at the right side of the Divan assembly.

4.13.4.6 Remove the board retainer.

4.13.4.7 Identify the central location of the ADDA PCB. Refer to Figure 4-13.

NOTE: The ADDA PCB contains DIP switches.

4.13.4.8 Remove the ribbon data cable from CPU2 and ADDA PCB's.

4.13.4.9 Carefully unplug the ADDA PCB from the motherboard by raising it straight up and out of its retainer.

4.13.4.10 On the replacement ADDA PCB set all DIP switches to the up position. Insert the replacement PCB in the central motherboard location. Be certain the PCB is fully seated into the socket.

4.13.4.11 Reconnect the ribbon data cable to the ADDA and the CPU2 PCB's.

4.13.4.12 Restore AC power to the machine and enable the circuit breakers.

4.13.4.13 Reinstall the cover plate over the PCB boards, (at the end of the PMC).

4.13.4.14 Turn the System Power switch to ON, then follow the Divan prompts and ensure the Divan successfully completes its self test routine.

4.13.4.15 Enter the parts usage in the replacement parts service menu.

4.13.4.16 Perform the PMC procedure given in Section 6 of the Narkomed 6000 Technical Service manual.

4.13.5 Divan Software Upgrade Kit p/n 4117024, E-Prom Ver. 7.40 p/n 4116983-001, 4116983-002 Replacement

CAUTION: The firmware E-proms used in the Divan ventilator are installed as a set of components on CPU1 daughter PCB and CPU2 PCB's, as such the software versions on each PCB must be identical.

4.13.5.1 Turn the System power switch to STANDBY. Start the Divan in Service Mode by pressing the left pad of the STANDBY button and the pad above it, while turning the System power switch to ON. Rotate the knob to display LOGBOOK and press the knob. Review the last ten logbook entries, then press the knob to exit the function.

4.13.5.2 Turn the System power switch to STANDBY.

4.13.5.3 Disconnect AC power from the machine and pull all circuit breakers to their 'out' position.

CAUTION: Use ESD precautions when handling any of the Divan electronics assemblies. These boards contain static sensitive components.

4.13.5.4 Raise the Divan tabletop cover to its open position.

4.13.5.5 Remove the cover plate at the right side of the Divan assembly.

4.13.5.6 Remove the board retainer.

4.13.5.7 Identify the location of CPU1 and CPU2 PCB's. Refer to Figure 4-13.

NOTE: CPU1 PCB is in the extreme right location identified as CPU-STANDARD 2; CPU2 PCB is in the extreme left identified as LP-CPU.

4.13.5.8 Remove the ribbon data cable from CPU2 and ADDA PCB's.

4.13.5.9 Carefully unplug the CPU1 and CPU2 PCB's from the motherboard by raising them straight up and out of their sockets.

4.13.5.10 Locate the E-prom on each PCB. Refer to Figure 4-13C.

4.13.5.11 Using an IC extraction tool, remove the E-prom from each CPU.

4.13.5.12 Using an IC insertion tool carefully install the replacement E-proms on the correct PCB's. Pay particular attention to the correct orientation of the IC components. The notch in each IC must correspond with the notch in the board socket.

NOTE: Each firmware IC has an identifying label that corresponds with the CPU. 4116983-001 shall only be used in CPU1, 4116983-002 shall only be used in CPU2.

4.13.5.13 Reinstall CPU1 and CPU2 PCB's.

4.13.5.14 Reconnect the data ribbon cable to CPU2 and ADDA PCB's.

4.13.5.15 Reinstall the board retainer on the top of the PCB boards.

4.13.5.16 Restore AC power to the machine and enable the circuit breakers.

4.13.5.17 Reinstall the cover plate over the PCB boards, (at the end of the PMC).

4.13.5.18 Turn the System Power switch to ON, then follow the Divan prompts and ensure the Divan successfully completes its self test routine.

4.13.5.19 Locate the Operator's Instruction Manual binder. If the revision date is before 15 January 2001, remove the existing Operator's Instruction Manual and replace it with the new Operator's Manual (P/N 4114915-007) supplied in the kit.

4.13.5.20 Enter the parts usage in the replacement parts service menu.

4.13.5.21 Perform the PMC procedure given in Section 6 of the Narkomed 6000 Technical Service manual.

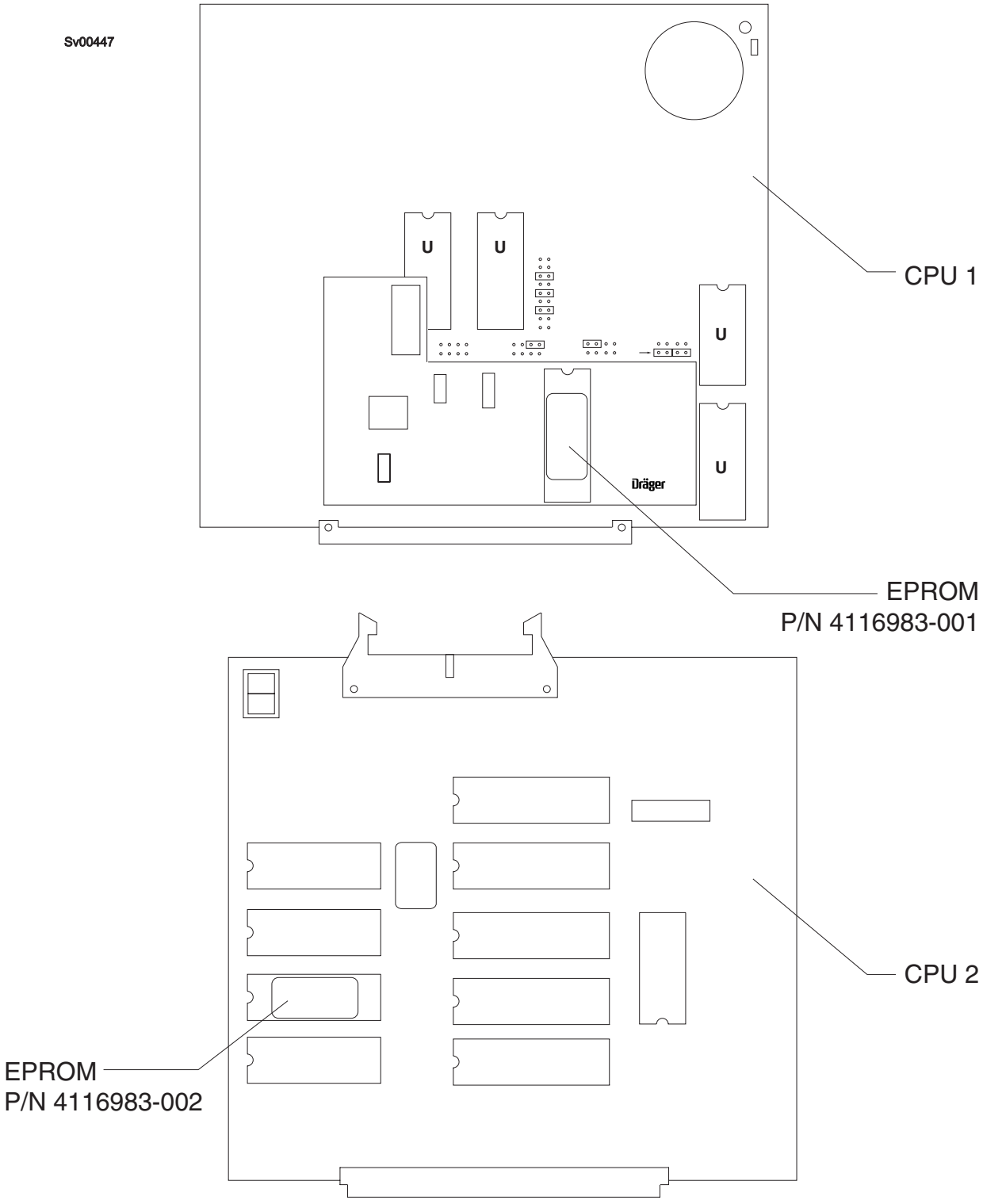


Figure 4-13B. Location of EPROMs on CPU 1 and CPU 2

4.13.6 9.0v Nicad Battery p/n 8301856 Replacement on Motherboard

4.13.6.1 Disconnect AC power from the machine and pull all circuit breakers to their 'out' position.

CAUTION: Use ESD precautions when handling any of the Divan electronics assemblies. These boards contain static sensitive components.

4.13.6.2 Remove the front bumper from the Divan ventilator chassis by removing the five screws at underside of front bumper; one screw at right side rail; three screws securing the left side of the bumper to the bag pole, in order to swing the bumper away from the ventilator. See Figure 4-13D.

4.13.6.3 Remove the three screws holding the front bar of the ventilator chassis. (These screws also retain the front display bezel of the ventilator.) Set the bar aside and carefully pull the front display bezel downward, and carefully disconnect its ribbon cable from the motherboard. Set the assembly aside.

4.13.6.4 Locate the 9v Nicad battery before removing it note its orientation and polarity on the motherboard. Align the positive (+) battery terminal with the positive (+) marker on the battery holder and carefully install the replacement battery.

4.13.6.5 Position the display bezel assembly at the front of the ventilator chassis and carefully reconnect its ribbon cable to the motherboard.

4.13.6.6 Set the display bezel in place. While holding the bezel assembly in place, reattach the front bar with the three screws that were previously removed.

4.13.6.7 Reinstall the front bumper.

4.13.6.8 Restore AC power to the machine and enable the circuit breakers.

4.13.6.9 Turn the System Power switch to ON and verify that the ventilator successfully completes its self-test routine.

4.13.6.10 Enter the parts usage in the replacement parts service menu.

4.13.6.11 Perform the PMC given in Section 6 of the Narkomed 6000 Technical Service manual.

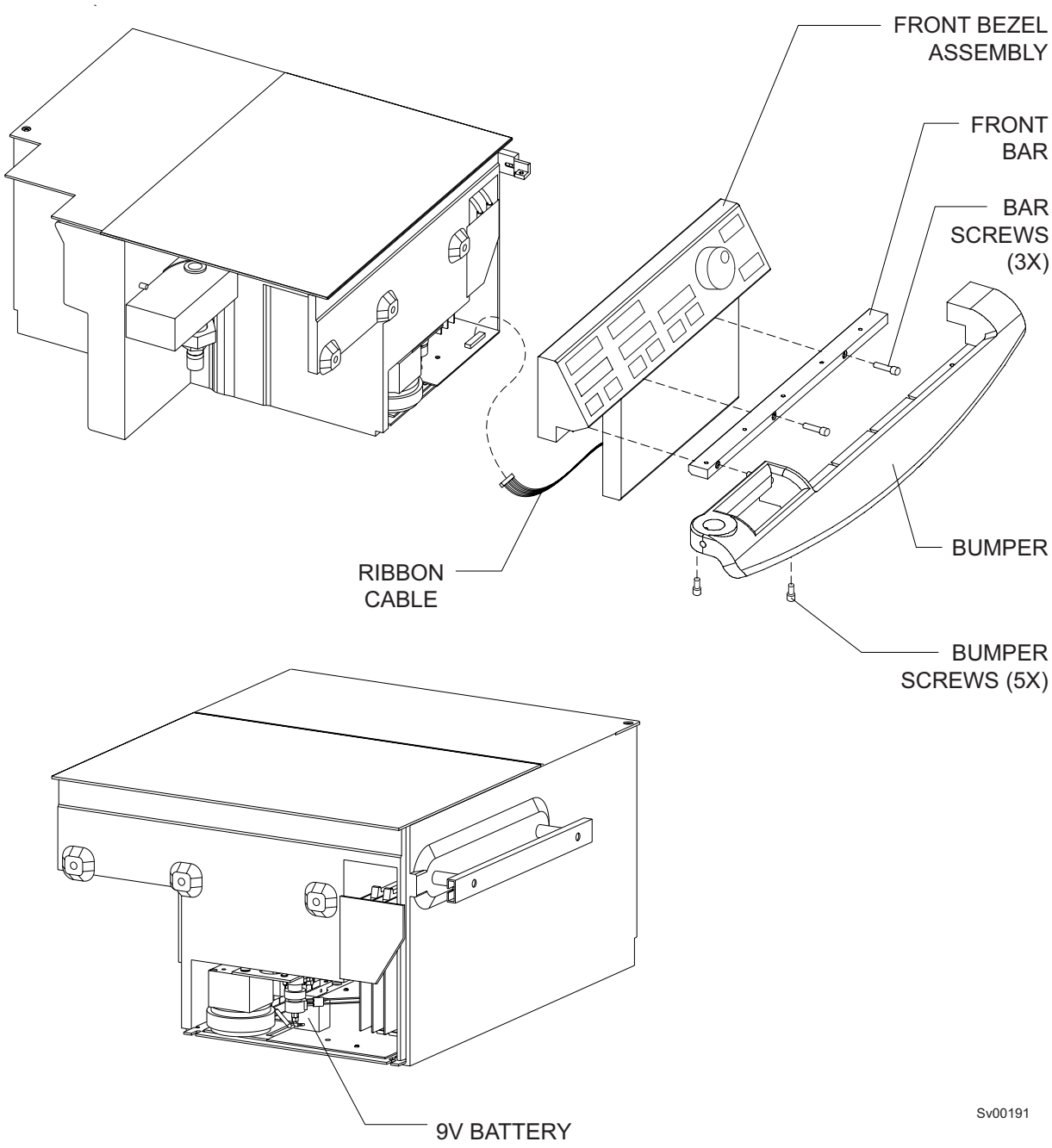


Figure 4-13D. Location of 9 V Battery on Motherboard

4.14 Breathing System

The breathing system includes the breathing circuit connections, inspiratory and expiratory valves, APL valve, absorber canister, and the diaphragm valves that are controlled by the Divan ventilator. The breathing system is removable from the machine as a complete unit. Further disassembly is shown in Figure 4-14.

NOTE: The absorber canister, located on the bottom of the breathing system, can be removed with the breathing system in place.

4.14.1 Turn the System Power switch to STANDBY.

4.14.2 Disconnect the breathing hoses, bag hose, scavenger hose, and all other connections to the breathing system.

4.14.3 Open the hinged top of the ventilator.

4.14.4 Turn the breathing system locking bar (¼ turn CCW) to unlock the breathing system.

4.14.5 Grasp the breathing system handle and lift the unit from the machine

4.14.6 Servicing the diaphragm valves:

4.14.6.1 Loosen the five ¼ turn locking screws to separate the control valve plate from the base. This provides access to the vent relief and air inlet valves. These valves can be removed by grasping the valve handle and turning it counter-clockwise.

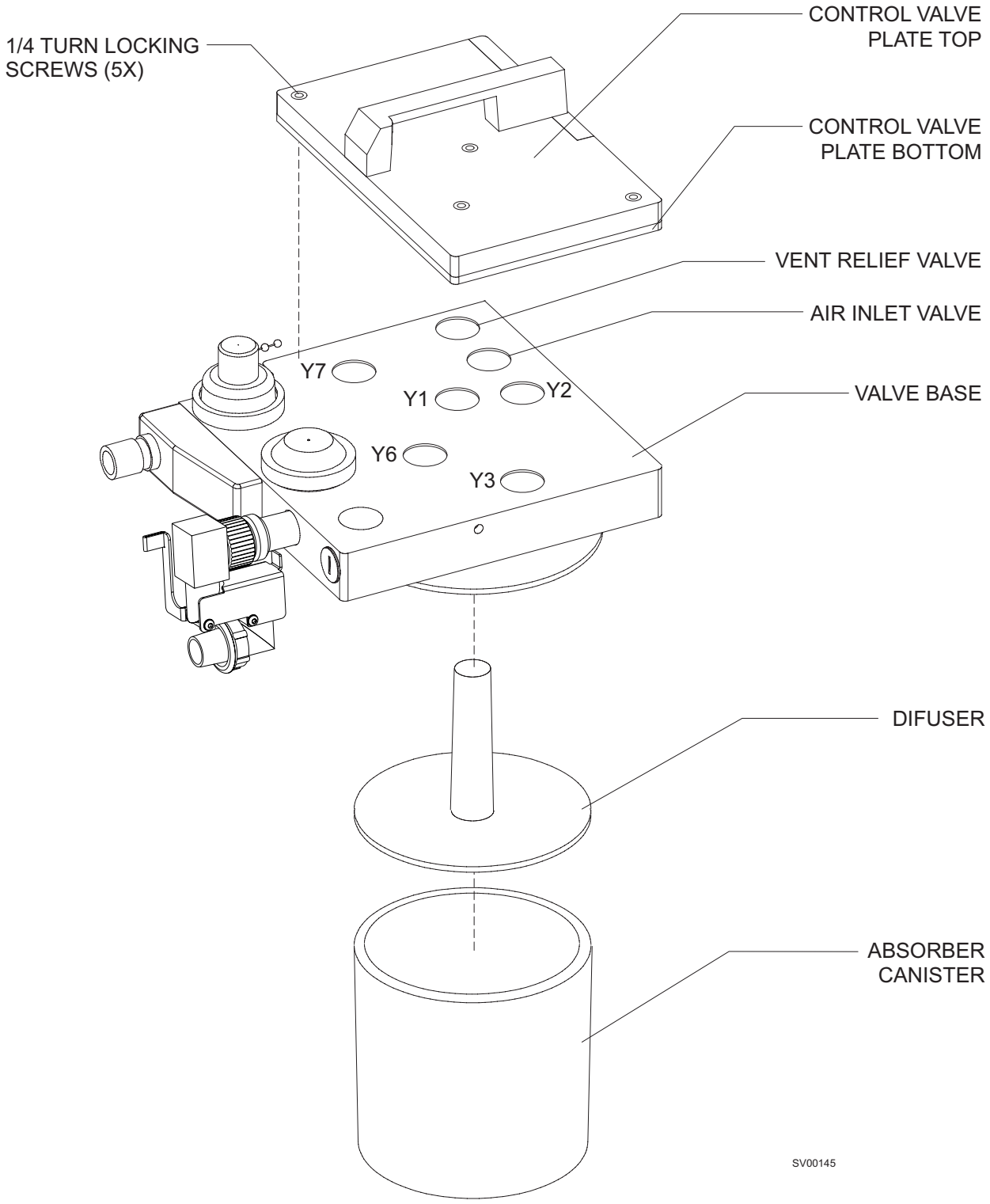
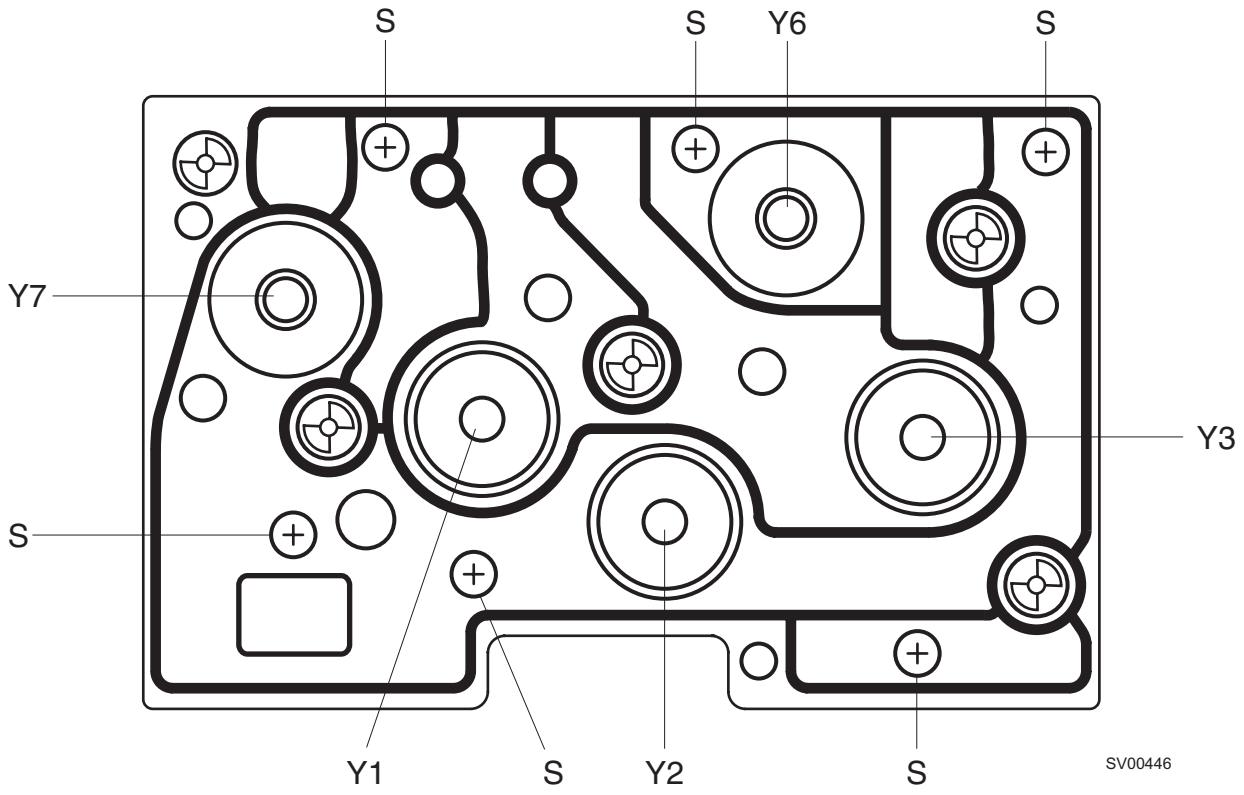


Figure 4-14. Breathing System



S= PHILLIPS HEAD SCREW (6X)

Figure 4-14A. Bottom View of Control Valve Bottom Plate

4.14.6.2 To access diaphragm valves Y1, Y2, Y3, Y6 and Y7, remove the six Phillips head screws from the bottom of the assembly (see Figure 4-14A). Then turn the assembly over and carefully separate the top and bottom control valve plates.

4.14.6.3 Note the orientation of diaphragm valves Y1, Y2 and Y3. Transfer the outer metal ring to the replacement diaphragm and install it at the correct location on the bottom plate. See Figure 4-14A for valve location, and Figure 4-14B for valve arrangement.

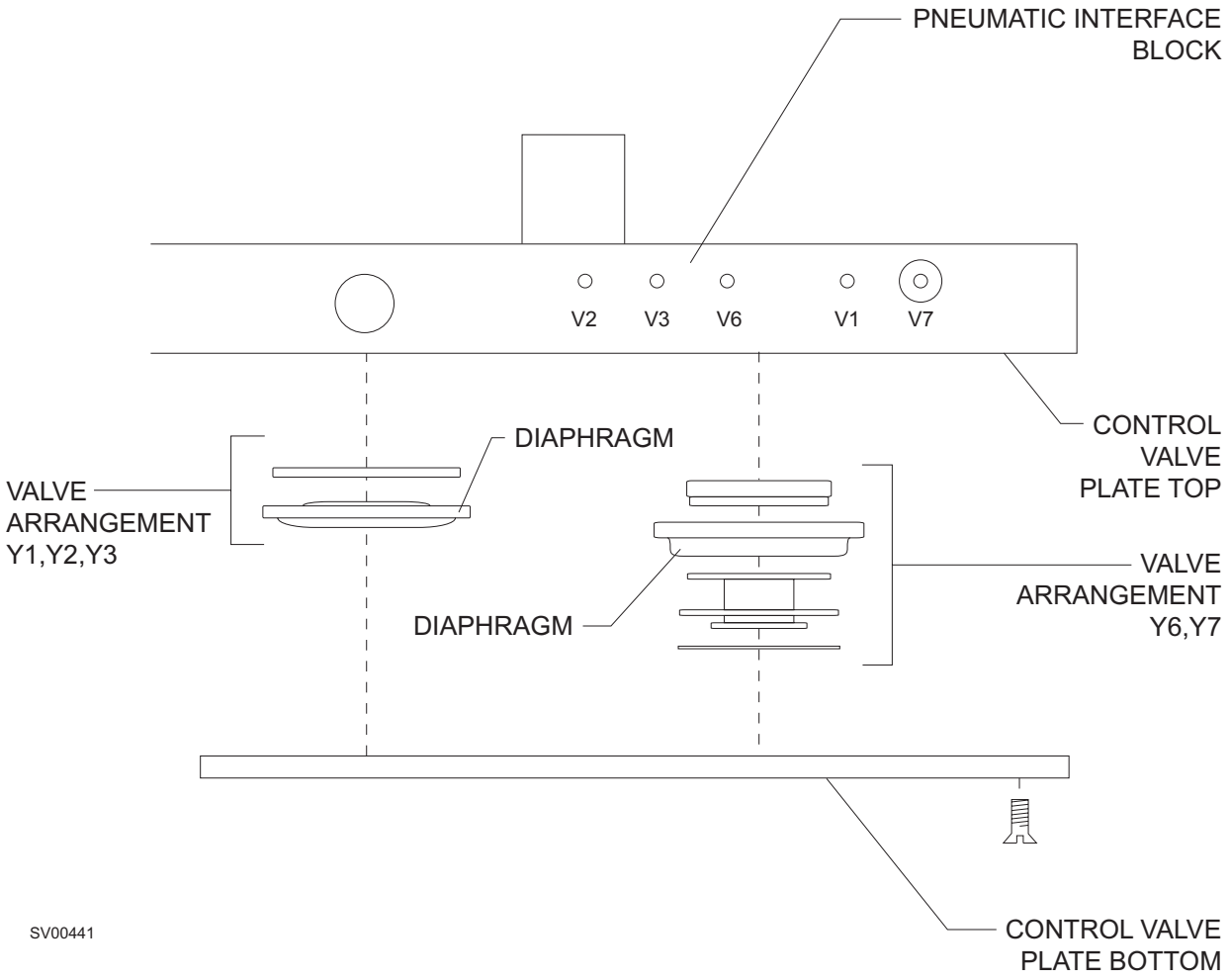


Figure 4-14B. Valve Assemblies

4.14.6.4 Note the orientation of diaphragm valves Y6 and Y7. Remove the diaphragms from the hub and metal ring, and assemble the replacement diaphragms in the same manner. Install the replacement diaphragm assembly at the correct location on the bottom plate.

4.14.6.5 Place the control valve top plate over the bottom plate and carefully turn the assembly over. Verify all diaphragm assemblies are centered into their recess. Reinstall the six Phillips head screws previously removed.

4.14.6.6 Exercise the diaphragms and verify their free motion. For each of the valves, occlude the corresponding numbered port on the pneumatic interface block at a forward then a backwards stroke and verify each diaphragm's ability to maintain vacuum and back pressure.

4.14.6.7 Ensure that all five ¼ turn locking acrews are fastened when reassembling the breathing system.

4.14.7 Reinstalling the breathing system:

Lower the unit into place and turn the locking bar (¼ turn CW) to lock the breathing system in place. When the breathing system is locked into place, several criteria must be met:

The breathing system must be level (top surface parallel to back edge of ventilator chassis).

The breathing system must activate the heating unit.

The breathing system must draw up tightly to the lip seals on the pneumatic interface and piston-cylinder unit when the locking bar is turned into place.

If adjustments are needed, refer to the appropriate procedure in Section 5 of this manual.

4.14.8 Reconnect all hoses that were previously disconnected from the breathing system.

4.14.9 If any components within the breathing system were replaced, perform the complete PMC Procedure as given in Section 6.

4.15 Breathing System and Ventilator Lip Seals

Lip seals at the breathing system pneumatic interface, piston-cylinder unit and ventilator chassis require scheduled replacement. Locations of these seals are shown in Figure 4-15. Following is a general procedure that applies to all the seals.

4.15.1 Turn the System Power switch to STANDBY.

4.15.2 Disconnect all hoses from the breathing system.

4.15.3 Open the hinged top of the ventilator.

4.15.4 Turn the breathing system locking bar (¼ turn CCW) to unlock the breathing system.

4.15.5 Remove the breathing system from the machine and set it aside.

4.15.6 Remove the piston-cylinder unit from the ventilator.

4.15.7 Insert a small (approx. 1.5 mm) flat blade screwdriver between the outer edge of the lip seal and its location hole. Move the screwdriver a full turn around the seal in order to detach the edge of the seal.

4.15.8 Insert a flat blade (approx. 2.5 to 3 mm) screwdriver through the hole of the seal and carefully pry the seal from its location hole.

4.15.9 Use the small flat blade screwdriver to remove any residual silicone from the seal location hole.

CAUTION: Do not occlude the seal or its location hole with silicone cement.

4.15.10 Install the new seal as follows:

-- Squeeze some silicone cement (P/N 1202537) between two pieces of paper to obtain a thin film.

-- Lightly press and turn the flat side of the new seal on the cement film, then press the lip seal into its location hole.

-- Allow approximately 30 min. drying time before reinstalling the piston-cylinder unit.

4.15.11 Reinstall the piston-cylinder unit and the breathing system. Ensure that the breathing system draws up to the pneumatic interface properly.

4.15.12 Reconnect all hoses to the breathing system.

4.15.13 Turn the System Power switch to ON; observe the ventilator self test and verify that there are no leaks in the system.

4.15.14 Perform the PMC Procedure given in Section 6.

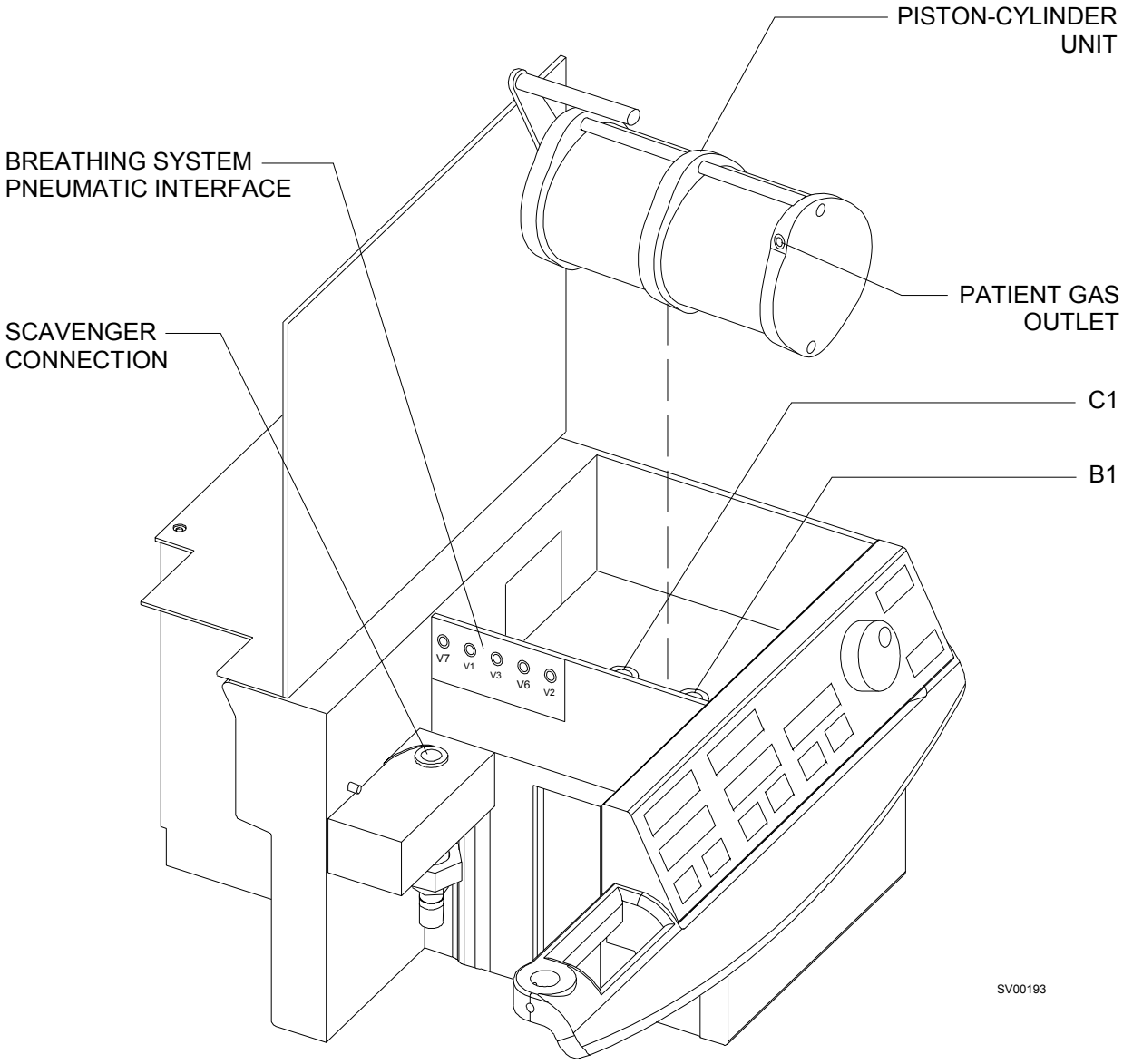


Figure 4-15. Lip Seal Locations

4.16 Ventilator Replacement: Complete Assembly

The Divan ventilator assembly is secured to the frame of the machine by two screws. Removal of the machine's back panel is needed for access to the ventilator cables and pneumatic connections. The following procedure outlines the removal sequence, with details illustrated in Figure 4-16.

4.16.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

4.16.2 Close all cylinder valves except for one O_2 cylinder.

4.16.3 Set the oxygen flow to 5 L/min.

4.16.4 Open the other gas flow control valves to drain pressure from the system.

4.16.5 Close the O_2 cylinder valve, and close the flow control valves. Press the O_2 Flush valve to drain pressure from the system.

4.16.6 Turn the System Power switch to STANDBY.

4.16.7 Remove the cylinders from the yokes.

4.16.8 Disconnect AC power from the machine and pull the circuit breaker knobs to their 'out' position.

4.16.9 Disconnect all hoses from the breathing system.

4.16.10 Remove the breathing system form the ventilator chassis.

4.16.11 Remove the piston-cylinder unit from the ventilator chassis.

4.16.12 Remove the front bumper from the ventilator chassis: There are five screws on the underside of the bumper, and one screw at the right side rail. You will also need to remove the screws securing the left side of the bumper to the bag pole flange, in order to swing the bumper away from the ventilator. (Ref.)

4.16.13 Remove the lower back panel from the machine.

4.16.14 Disconnect the O_2 supply line at the regulator assembly (see illustration).

4.16.15 Disconnect the breathing pressure line from the Divan.

4.16.16 Disconnect the ground wire at the back of the ventilator chassis.

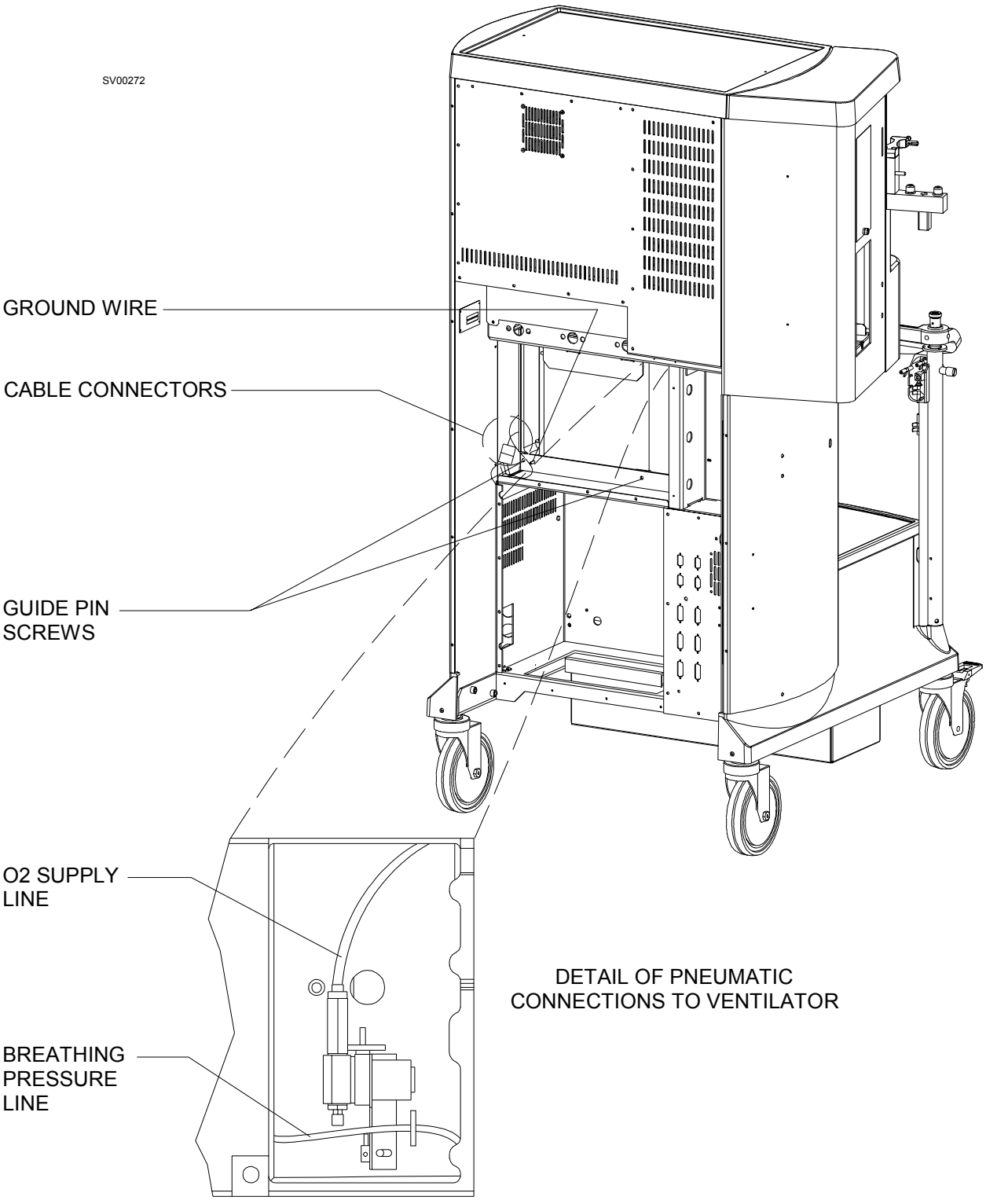
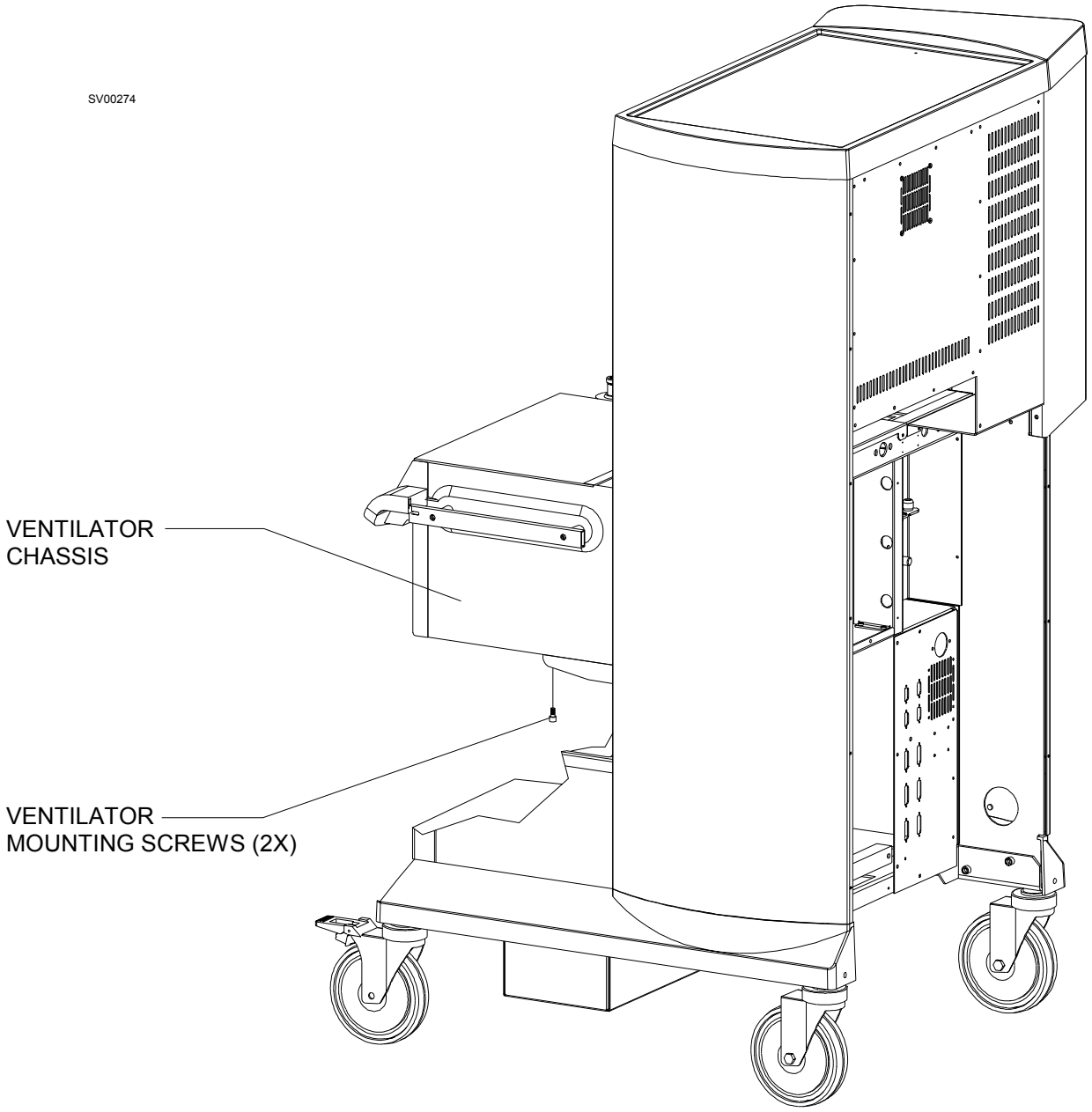


Figure 4-16. Divan Ventilator Replacement



Divan Ventilator Replacement

4.16.17 Disconnect the ventilator cable connectors: these are found along the left side (facing the rear) of the ventilator chassis.

NOTE: The service exchange assembly is only available with painted writing surface. If your machine is equipped with a stainless steel upgrade, the table tops must be exchanged.

4.16.18 Remove the two ventilator mounting screws at the underside of the front shelf rails (see illustration) and carefully slide the ventilator chassis out the front of the machine.

4.16.19 Position the replacement ventilator chassis on the shelf and slide it back into position. At the back of the machine, the guide pins in the back rail should line up with the corresponding holes in the ventilator chassis to allow the chassis to be moved into position.

If the guide pins do not line up with the holes, loosen the guide pin screws and move them into alignment; move the ventilator chassis into position and then tighten the guide pin screws.

4.16.20 Reinstall the two ventilator mounting screws at the underside of the front shelf rails.

4.16.21 Reconnect all of the ventilator cables.

4.16.22 Reconnect the ground wire at the back of the ventilator chassis.

4.16.23 Reconnect the breathing pressure line.

4.16.24 Reconnect the O_2 supply line.

4.16.25 Reinstall the back panel on the machine.

4.16.26 Reinstall the table lamp panel.

4.16.27 Reinstall the front bumper on the ventilator chassis.

4.16.28 Reinstall the piston-cylinder unit in the ventilator chassis.

4.16.29 Reinstall the breathing system in the ventilator chassis, and restore all hose connections to the breathing system.

4.16.30 Reinstall the cylinders.

4.16.31 Enable the circuit breakers and restore power to the machine.

4.16.32 Locate the Operator's Instruction Manual binder. If the revision date is before 15 January 2001, remove the existing Operator's Manual and replace it with the new Operator's Manual supplied with the rdplacement Divan.

4.16.33 Perform the PMC Procedure given in Section 6.

4.17 Caster

Each caster is retained by a set screw in the side of the lower frame rail as shown in Figure 4-17. Caster replacement requires that the machine be tilted to provide enough clearance for the caster stem to be withdrawn from the bottom of the frame rail.

NOTE: Front caster replacement on early machines requires that the lower frame cover (skirt) be removed for access to the caster set screws. Refer to replacement procedure 4.28.

WARNING: Do not raise the side of the machine more than 3 inches, or the minimum clearance needed to remove the caster. Failure to observe this precaution may result in a tip-over, causing personal injury.

4.17.1 Remove all vaporizers, unsecured equipment and accessories from the machine.

4.17.2 Remove the lower frame cover (skirt) from the machine. Refer to the appropriate procedure in this section.

4.17.3 Lock the front casters.

4.17.4 Obtain a pallet mover, hydraulic jack or similar lifting device and a brace capable of supporting one side of the machine with its casters approximately three inches from the floor. Block the caster wheels opposite to the side that will be raised. Remove the affected caster's retaining set screw.

4.17.5 Using at least two people to steady the machine, raise one side only enough to clear the frame well. DO NOT EXCEED THREE INCHES. Slip the new caster into the well and lower the machine to within ¼ in. of the floor.

4.17.6 Align the replacement caster and hold it in its seated position. Apply Loctite #222 (purple) to the set screw threads, then tighten the caster stem set screw.

4.17.7 Using at least two people, remove the support brace then carefully lower the machine to the floor.

4.17.8 Reinstall the skirt on the machine.

4.17.9 Check for proper operation of the caster and ensure that the front casters lock properly.

4.17.10 Reinstall any unsecured equipment and accessories that were previously removed.

4.17.11 Perform the PMC Procedure given in Section 6, including a vaporizer calibration verification.

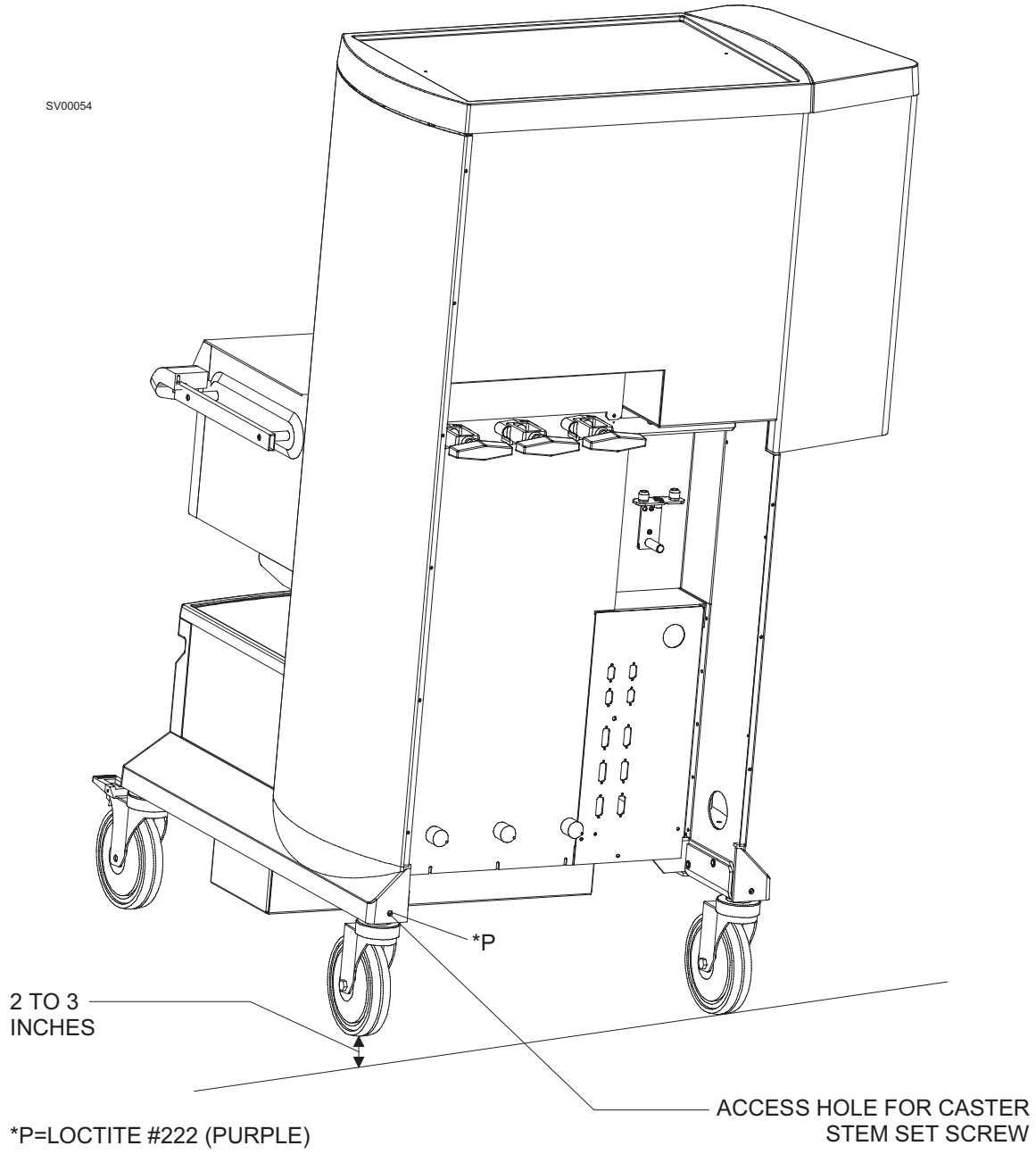


Figure 4-17. Caster Replacement

4.18 Battery

The backup battery bank comprises four batteries and is located in a compartment below the cabinet drawer. Access to the battery compartment requires removal of the drawer and drawer housing. Battery mounting and connection details are shown in Figure 4-18.

WARNING:Ensure that AC power is removed from the machine before opening the battery compartment. Failure to observe this precaution may cause injury by electric shock.

4.18.1 Turn the System Power switch to STANDBY and remove AC power from the machine.

4.18.2 Pull all circuit breakers to their 'out' positions.

4.18.3 Pull the drawer out to its fully extended position and lift it from the tracks.

4.18.4 Remove the drawer housing from the machine.

4.18.5 Remove the battery cover and retainer bracket.

4.18.6 Note the polarity markings, connections and orientation of the batteries so that the replacement batteries can be installed in the same manner.

4.18.7 Disconnect and remove the batteries.

4.18.8 Position the replacement batteries in the compartment and connect them in the same manner as the original ones.

4.18.9 Reinstall the battery retainer bracket and cover.

4.18.10 Reinstall the drawer housing.

4.18.11 Pull the drawer tracks out to their fully extended position and reinstall the drawer. Ensure that it operates correctly.

4.18.12 Enable the circuit breakers and reconnect AC power to the machine.

4.18.13 Perform the PMC Procedure given in Section 6.

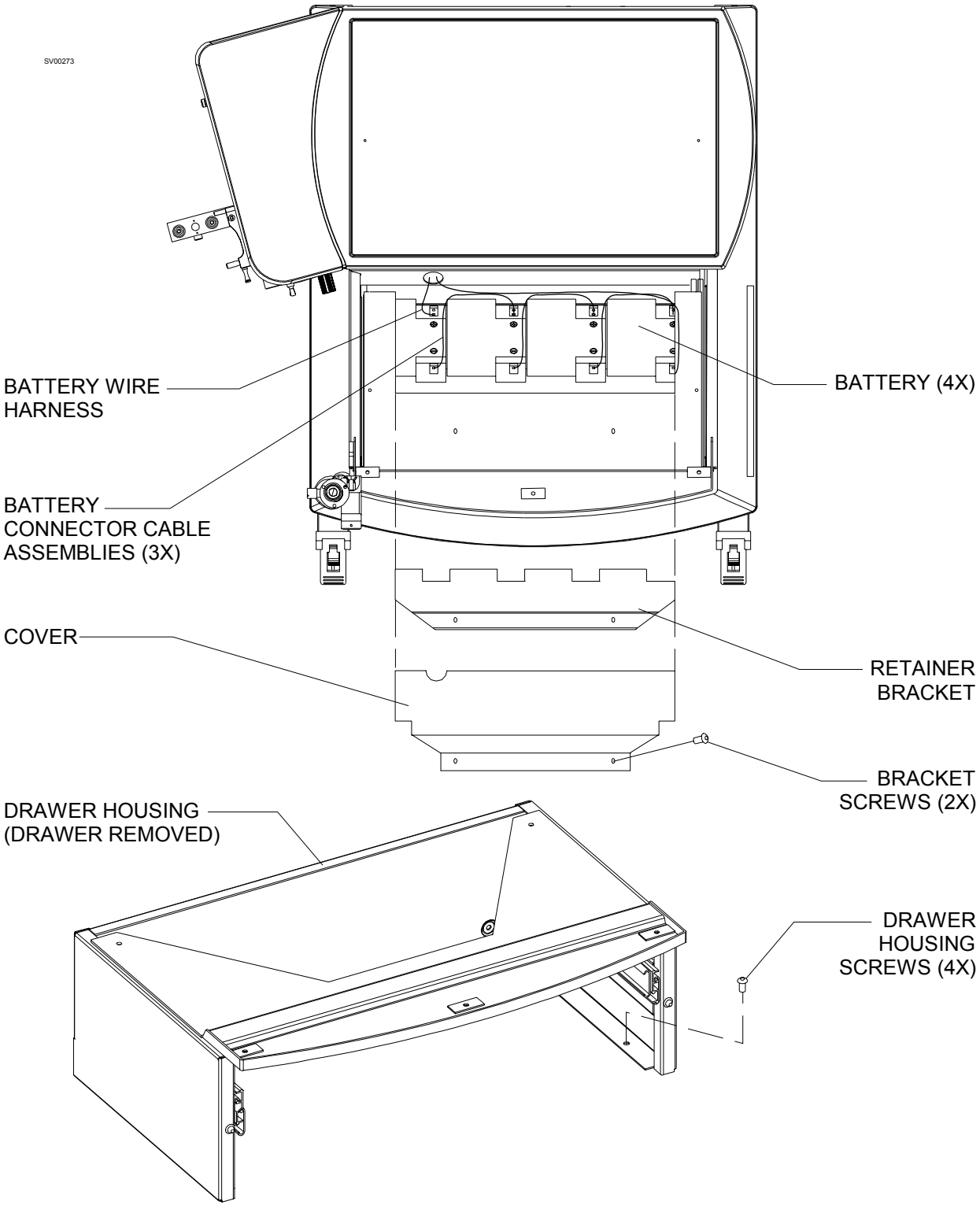


Figure 4-18. Battery Replacement

4.19 Power Supplies

The power supplies are contained in a box at the bottom of the machine, secured to the lower frame rails. This box also contains the circuit breakers and power entry. The internal components are not serviced in the field. The power supply mounting and connection arrangement is shown in Figure 4-19.

NOTE: The labeling on the power supply must include the following:
MODEL CPS12007 REV: D (or later)
NAD P/N 4114431 REV: F (or later)
All earlier revisions must be replaced.

4.19.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

4.19.2 Close all cylinder valves except for one O_2 cylinder.

4.19.3 Set the oxygen flow to 5 L/min.

4.19.4 Open the other gas flow control valves to drain pressure from the system.

4.19.5 Close the O_2 cylinder valve, and close the flow control valves. Press the O_2 Flush valve to drain pressure from the system.

4.19.6 Turn the System Power switch to STANDBY.

4.19.7 Remove AC power from the machine and wait three minutes for NT operating system in WPU to shut down.

WARNING:Ensure that AC power is removed from the machine before servicing the power supply. Failure to observe this precaution may cause injury by electric shock.

4.19.8 Pull all circuit breakers to their 'out' position. Loosen the AC power cord retainer bracket and unplug the cord from the power supply.

4.19.9 Remove the cylinders from the yokes.

4.19.10 Remove the lower left back panel from the machine.

4.19.11 Disconnect all cables from the communication ports, and swing open the door with the communication ports.

4.19.12 Disconnect all of the cables at the top rear of the power supply box, and unplug the convenience outlet cord.

4.19.13 Place a support under the power supply box to hold it in place while the attaching screws are being removed.

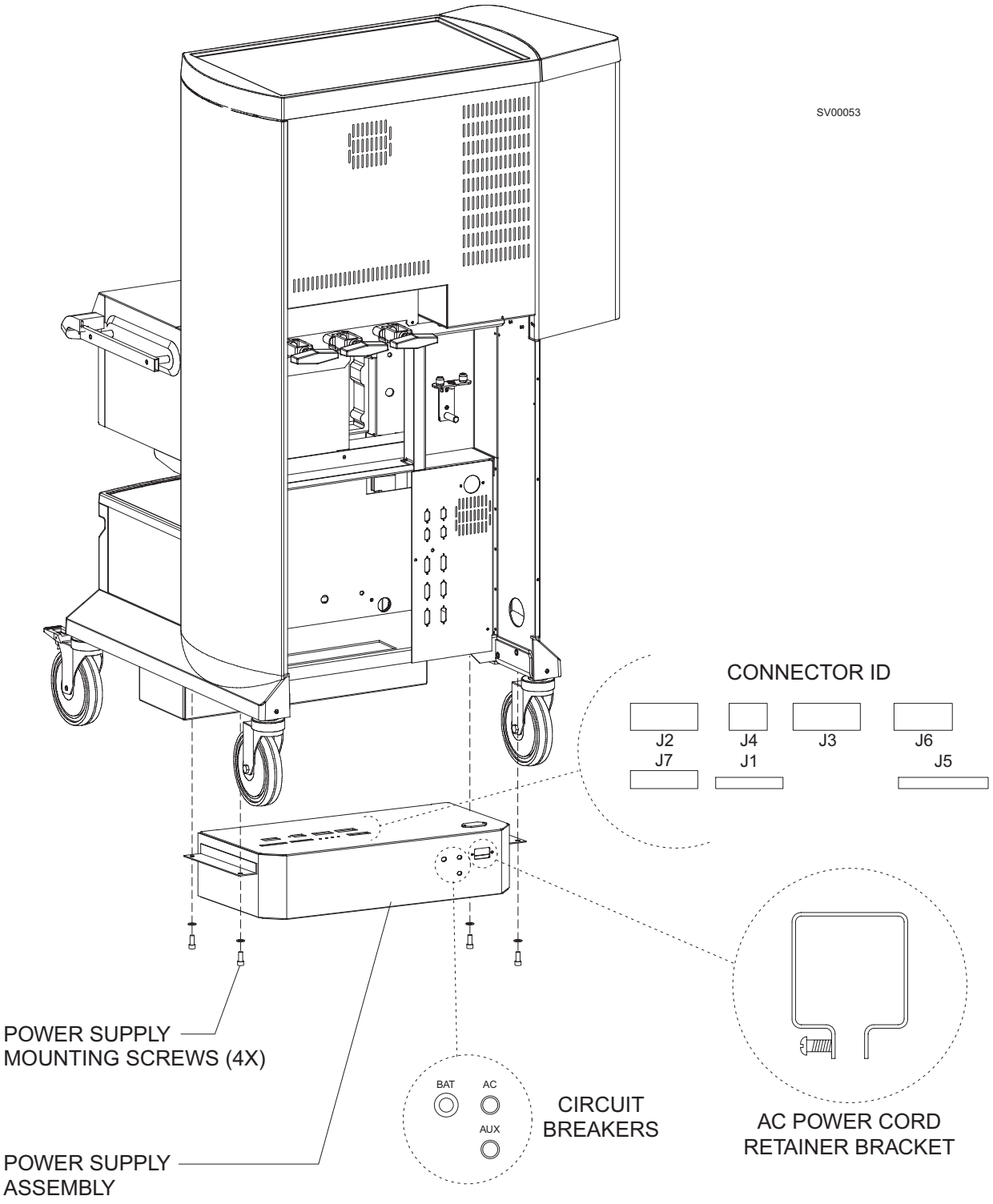


Figure 4-19. Power Supply Replacement

4.19.14 Remove the four screws attaching the power supply box to the frame rails, and slide the box out from under the machine.

4.19.15 Verify that the replacement power supply bears the correct labeling. See the Note at the beginning of this procedure.

4.19.16 Position the replacement power supply box under the machine and secure it to the frame rails with the hardware that was previously removed.

4.19.17 Verify that the circuit breakers are in their 'out' position.

4.19.18 If needed, install a CAUTION High Voltage label (P/N 4115070) on the battery pack's red wire harness near the power supply connector located at J5 of the power supply.

4.19.19 Reconnect all of the cables and the convenience outlet cord.

4.19.20 Reinstall the back panel on the machine.

4.19.21 Close the communication port panel and reconnect any cables that were previously disconnected.

4.19.22 If re-attaching the 2-pin wire harness to the Vitalbus Hub at J13, verify its proper orientation. From the header connector the wires must route to the right as shown in Figure 4-19A, with the brown wire above the black wire.

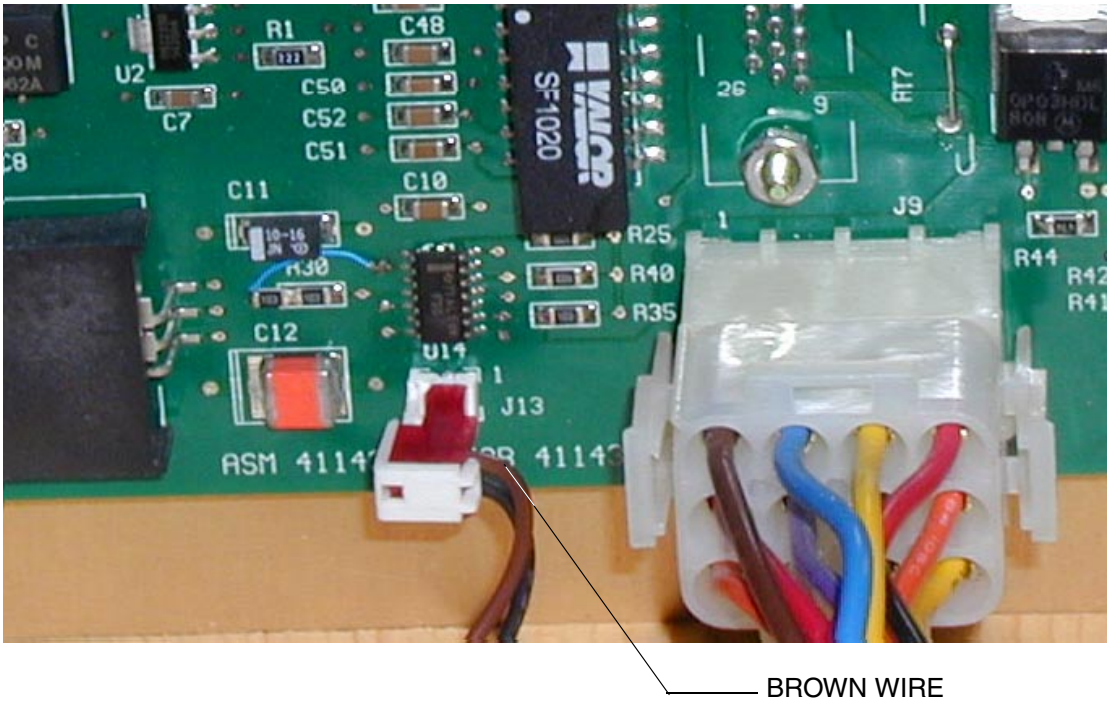


Figure 4-19A. J13 Connector Orientation

NOTE: You must install the power cord as described in the next step. The cable clamp arrangement is designed to prevent accidental disconnect.

4.19.23 Insert the AC power cord into the retaining bracket on the power supply, and tighten the retaining screw.

4.19.24 Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole dirrectly above the power cord socket as shown in Figure 4-19B.

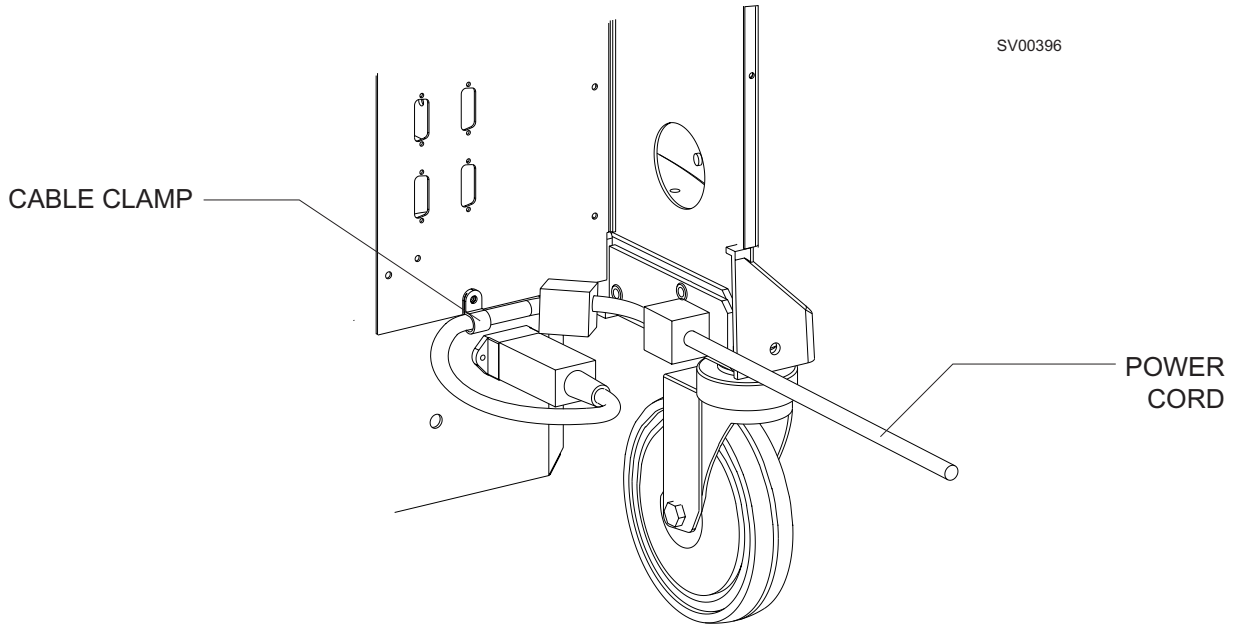


Figure 4-19B. Power Cord Routing

4.19.25 Reinstall the cylinders in their yokes.

4.19.26 Reconnect the pipeline supplies.

4.19.27 Enable the circuit breakers and reconnect AC power to the machine.

4.19.28 Turn the System Power switch to ON and verify that the power-up self test is successfully completed.

4.19.29 If the machine is equipped with a flat panel display, perform the position, brightness, contrast and phase calibrations given in Section 5.

4.19.30 Perform the PMC Procedure given in Section 6.

4.20 Workstation Processor Assembly (WPU)

The processor assembly is located in the lower part of the machine, below the ventilator. Access to the assembly requires removal of the lower left back panel and disconnecting the power supply cables. The processor mounting and connection arrangement is shown in Figure 4-20.

NOTE: If a new processor is installed in the field, then a new machine serial number needs to be entered on the NM6K page of the machine's Service Config notebook. If you are not able to make this entry, then contact DrägerService for more information. Be sure to properly document the processor exchange.

CAUTION: All processors are shipped from DMI with software Version 2.06. If the failed WPU was at version 3.01 as identified by a label near the serial number plate, the installed WPU must be loaded with 3.01 software at the customer site. Refer to instructions provided in Field Service Procedure SP00236: Narkomed 6000 3.01 Enhancement. If the original processor is of an earlier vintage, upgrade 2.06 kit 4117240 must be installed to ensure proper system performance. If the machine is configured with an Integrated Patient Monitor (IPM), the part number on the pod must be 4113465-005. If the pod is of an earlier vintage, an updated IPM pod P/N SE4113465-005 and IPM Operator's Manual P/N 4116574-002 must be installed to ensure proper operation. If the software version of the processor can not be determined, use the GAP part number for identification purposes. If the part number is ≤ 4112970-005, install upgrade 2.06 kit 4117240. Refer to TSB 6007 for additional information.

CAUTION: There are three different processor styles currently in use in the Narkomed 6000. The correct choice is essential to ensure the units proper operation and compatibility with optional PODs. Refer to the following options:

Option 1: P/N 4114467 or SE4114467 contain a 166 MHz processor w/32 Meg RAM and 4 communication ports. Will not support IPMM or SCR PODs. Use replacement part SE4115904.

Option 2: P/N 4115904 (aka 4115905) or SE4115904 contain a 233 processor w/64 Meg RAM and 4 communication ports. Will support GAP, IPMM and SCR PODs. This style processor can be used as a direct replacement for 4114467, SE4114467, 4115904, (aka 4115905) or SE4115904.

Option 3: PN 4116918 (aka 4116725) or SE4116918 contain a 700 MHz processor w/64 Meg RAM and 1 communication port. Will support GAP, IPMM and SCR PODs. This style processor can only be used as a direct replacement for 4114467, SE4114467, 4115904 (aka 4115905) or SE4115904 after converting the Vitalbus Hub to a single communication port configuration. Refer to Section 7.11 for conversion instructions.

4.20.1 Turn the System Power switch to ON. Refer to the "Service Parts Screens" and record all pertinent component replacement information. This information must be entered into the replacement processor.

4.20.2 Turn the System Power switch to STANDBY.

4.20.3 Remove AC power from the machine and pull all circuit breakers to their 'out' position.

4.20.4 Close all cylinder valves and remove the cylinders from the yokes.

4.20.5 Disconnect all external cables from the communication HUB, and swing open the door with the communication HUB.

4.20.6 Remove the lower left back panel from the machine.

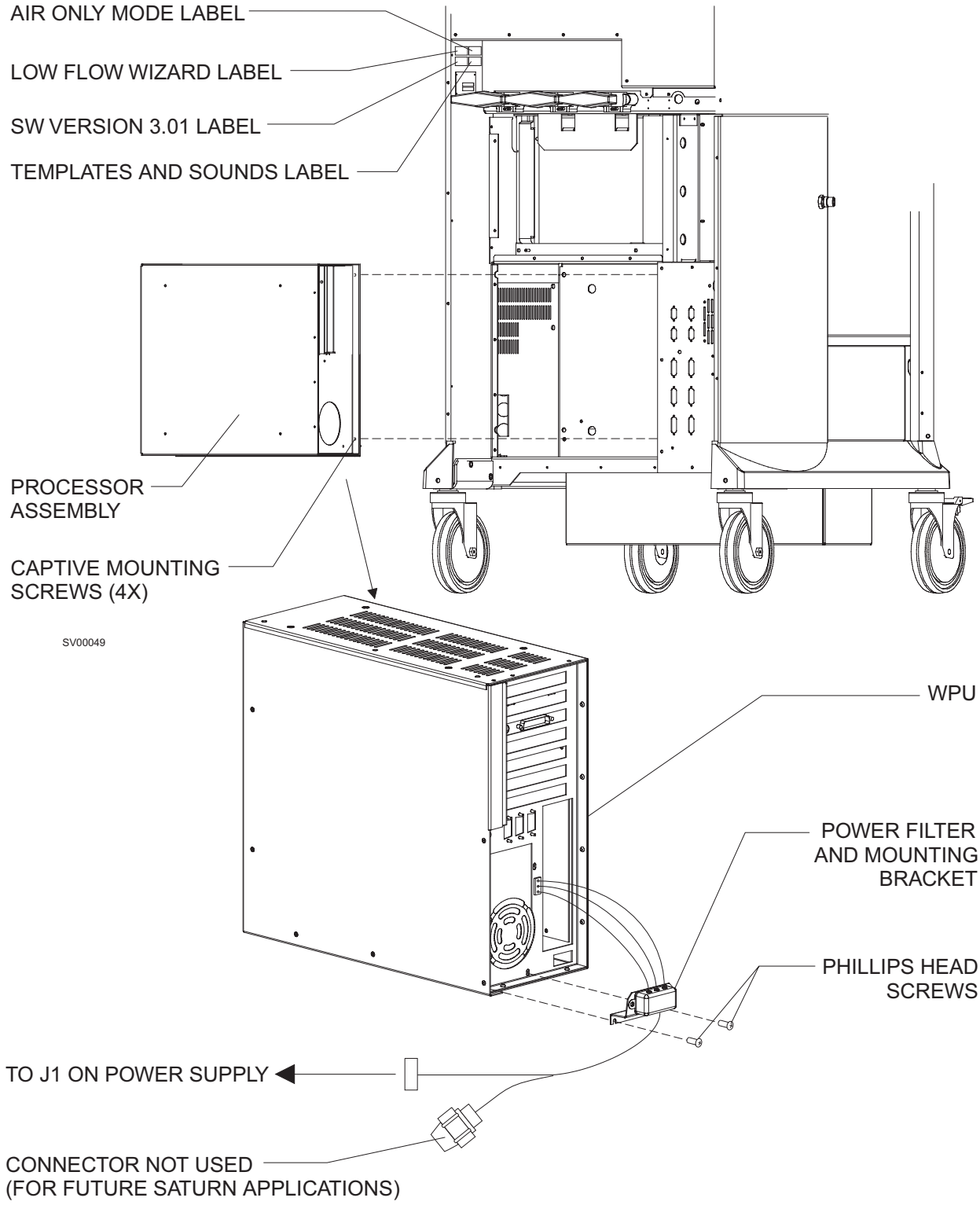


Figure 4-20. Processor Assembly Replacement

4.20.7 Disconnect all of the cables at the top rear of the power supply box, and move them out of the way.

4.20.8 If needed, install a CAUTION High Voltage label (P/N 4115070) on the battery pack's red wire harness near the power supply connector located at J5 of the power supply.

4.20.9 Disconnect all of the cables except the DC power cable, from the right side (facing the rear of the machine) of the processor assembly.

4.20.10 Loosen the four captive mounting screws securing the processor to the machine. You will need a long extension screwdriver to reach these screws.

4.20.11 Pull the processor assembly straight back and out of the machine.

4.20.12 For shipping it is necessary to remove the power filter and bracket from the WPU chassis. Loosen the two Phillips head screws securing the power filter mounting bracket to the processor chassis. Slide out the bracket, then retighten the screws.

4.20.13 Record the removed processor's serial number, then properly package the assembly for return to DrägerService using the packaging from the replacement processor.

4.20.14 On the replacement processor, attach the power filter mounting bracket to the chassis.

4.20.15 Record the replacement processor's serial number, then slide the assembly into place and secure it with the captive mounting screws.

4.20.16 Reconnect all of the processor cables that were previously disconnected.

4.20.17 Reconnect all of the power supply cables that were previously disconnected.

4.20.18 Keylok installation:

4.20.18.1 Low Flow Wizard:

If the machine is a DMI Demo unit or contains a Low Flow Wizard label near the serial number plate, this feature must be activated after the processor is replaced. If the software version is 1.06 - 2.05, contact DMI's Technical Service Department to obtain instructions to enable and test this feature. If the application software version is 2.06, activation of this feature requires a *Low Flow Wizard keylok assembly P/N 4116920-001 installed in the processor's parallel port. *If the machine contains both Low Flow Wizard enabled and Air-Only labels near the serial number plate, then a combination Low Flow Wizard & Air-Only keylok P/N 4116920-003 is required.

4.20.18.2 Air-Only Mode:

If the machine contains an Air-Only Mode label near the serial number plate, this feature must be activated after the processor is replaced.If the software version is 2.05, contact DMI's Technical Service Department to obtain instructions to enable and test this feature. If the application software version is ≥ 2.06, activation of this feature requires an *Air-Only keylok assembly P/N 4116920-002 installed in the processor's parallel port. *If the machine software version is 2.06 and contains both Low Flow Wizard enabled and Air-Only labels near the serial number plate, then a combination Low Flow Wizard & Air-Only keylok P/N 4116920-003 is required.

4.20.18.3 Templates and Sounds:

If the machine contains a Templates and Sounds label near the serial number plate, the Keylok assembly must be transferred to the replaced WPU.

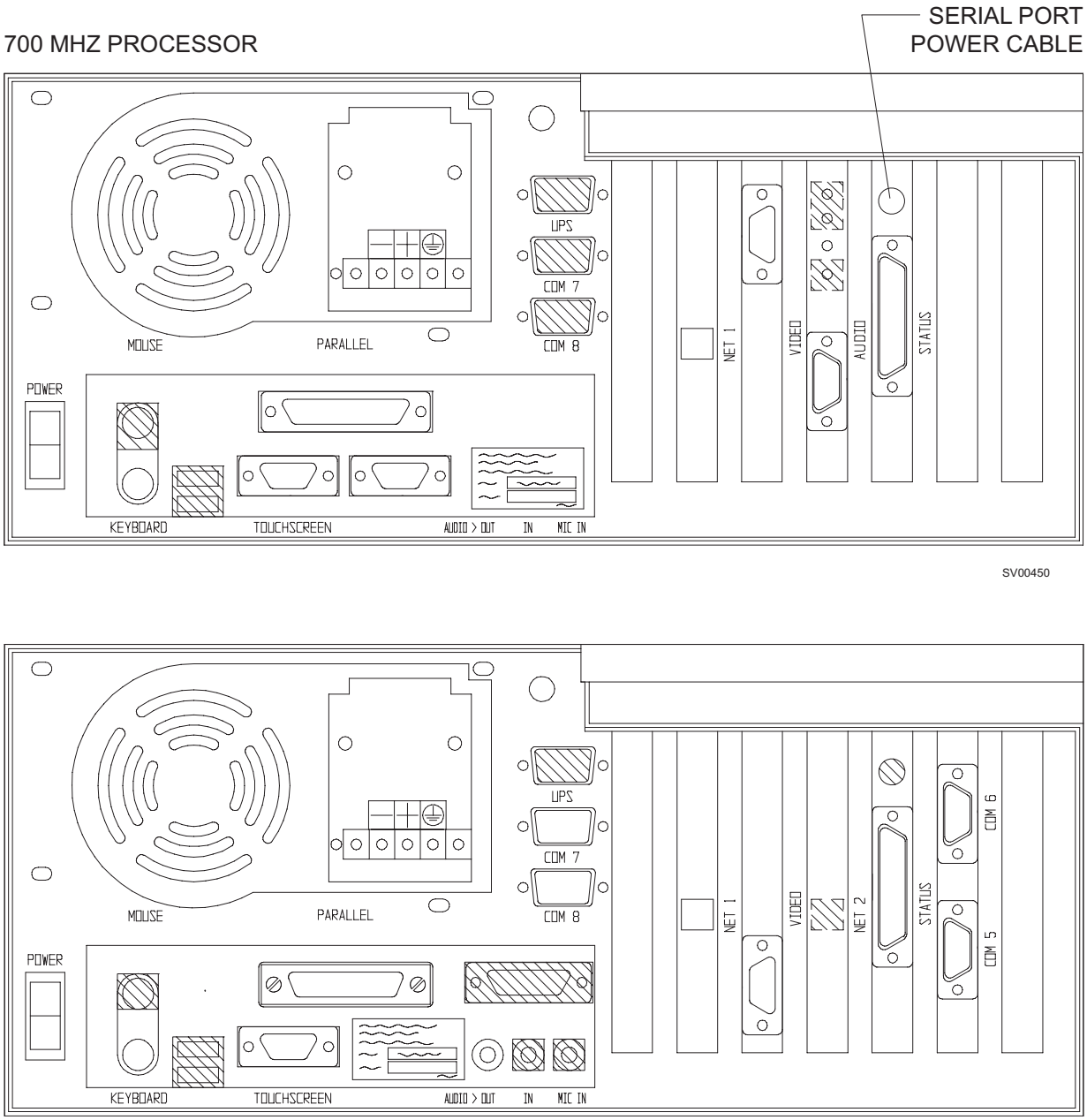


Figure 4-20A. WPU Connector Labeling

denotes connectors not used.

4.20.19 Reinstall the back panel on the machine.

4.20.20 When re-attaching the 2-pin wire harness to the Vitalbus Hub at J13, verify its proper orientation. From the header connector the wires must route to the right as shown in Figure 4-20D, with the brown wire above the black wire.

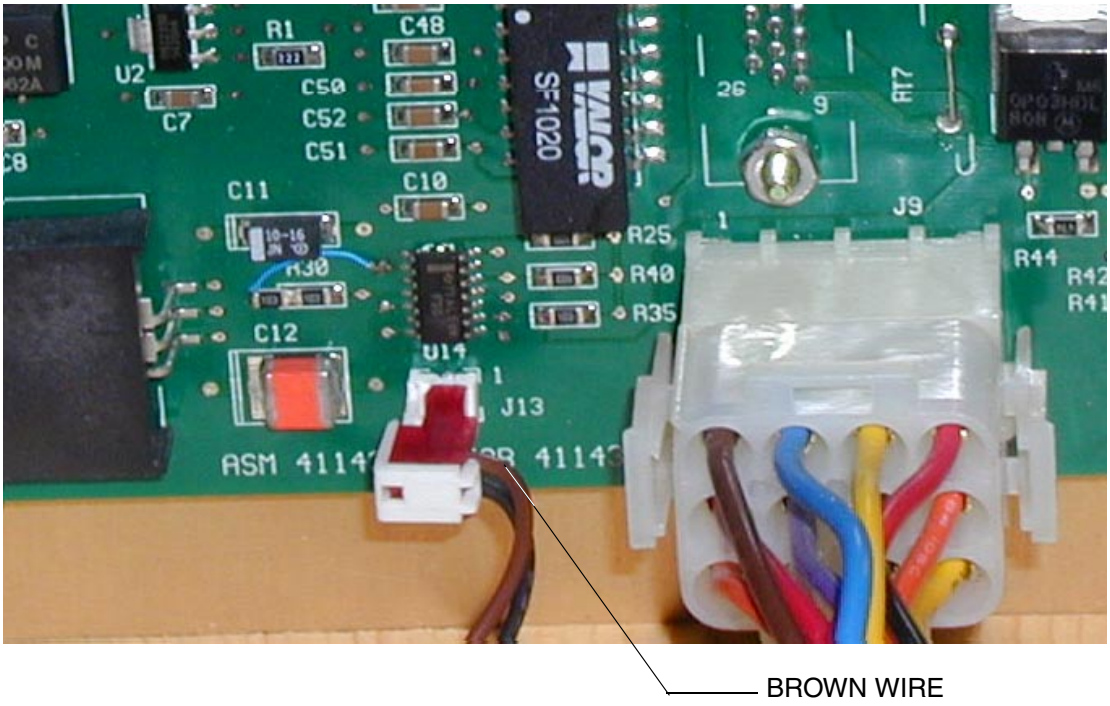


Figure 4-20D. J13 Connector Orientation

4.20.21 Close the communication HUB panel and reconnect any cables that were previously disconnected.

4.20.22 Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole directly above the power cord socket as shown in Figure 4-20E.

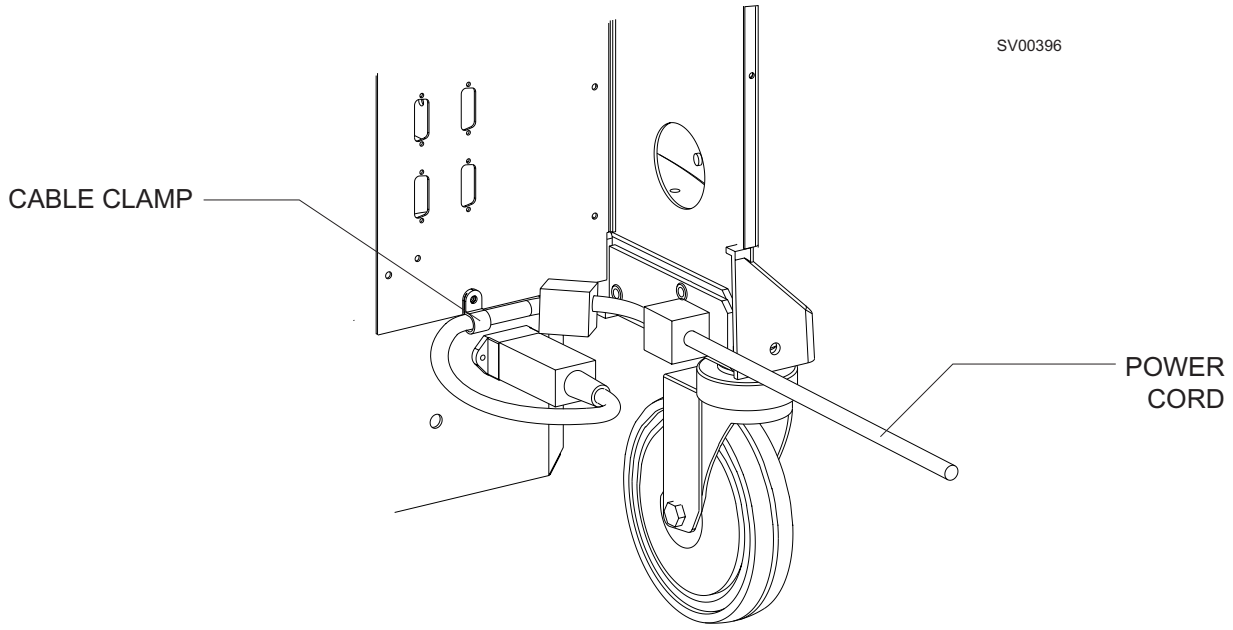


Figure 4-20E. Power Cord Routing

4.20.23 Reinstall the cylinders in their yokes.

4.20.24 Reconnect the pipeline supplies.

4.20.25 Enable the circuit breakers and reconnect AC power to the machine.

4.20.26 Turn the System Power switch to ON and verify that the power-up self test is successfully completed.

NOTE: If system does not power up, toggle the processor's power switch.

4.20.27 If the machine is equipped with a flat panel display, perform the position, brightness, contrast, phase and position calibrations given in Section 5.

4.20.28 Deleted

4.20.29 Re-enter all pertinent component replacement information into the "Service Parts Screen". Refer to Section 2.4.4.

4.20.30 Access the Advanced Service Mode. (refer to Accessing the Service Screens in Section 2.2 of this manual.) Select Service Config key, NM6K tab, select the SERVICE button and enter your Technicians ID#.

4.20.31 Press the 'Service Config' key, then press the Serial Number key. Using the virtual keyboard, re-enter the machine serial number. Press the Serial Number key again to store the value. See Figure 4-20E1.

4.20.32 Touch the Update tab in the NM6000 CONFIGURATION to access the UPDATE page. (Refer to Update Page in Section 2.4.2 of this manual.) Press the VPO and GAP Pod Base keys to initiate the POD Base download. Also press CV and SCR keys if these options are present. See Figure 4-20F.

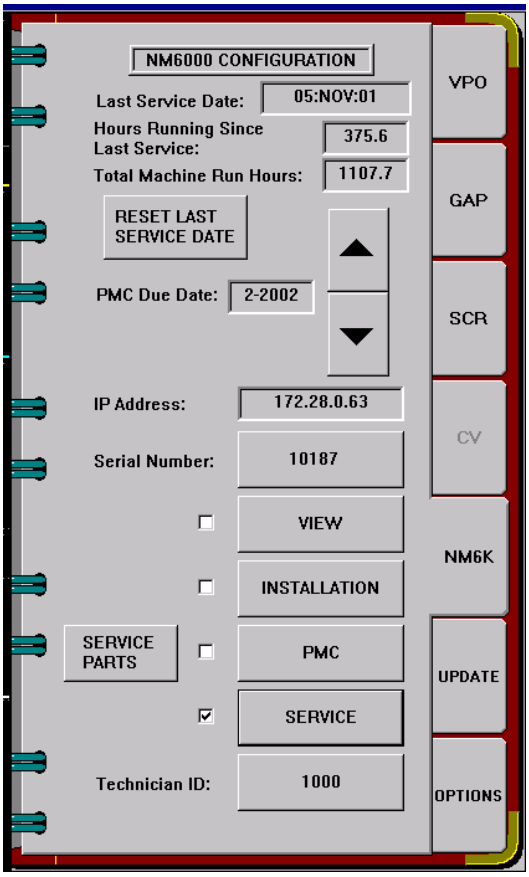


Figure 4-20E1. Machine Serial Number

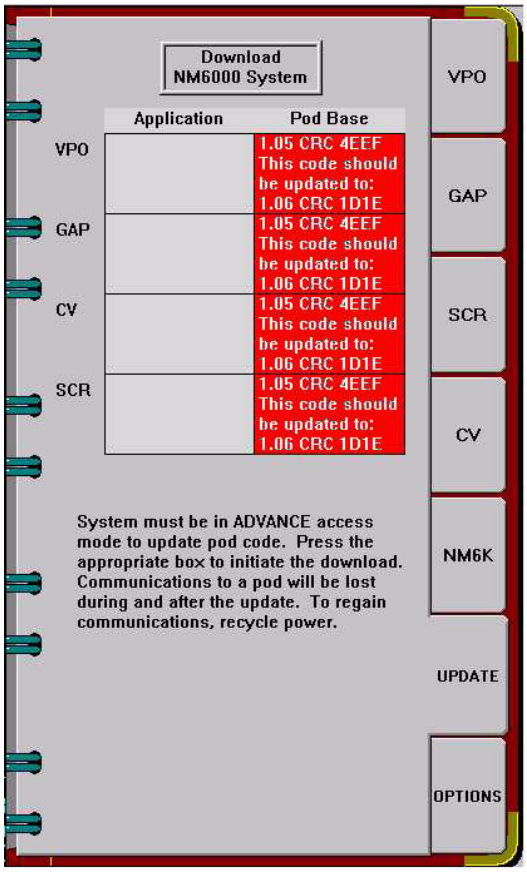

Download NM6000 System
Application
Pod Base
VPO
GAP
CV
SCR
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
System must be in ADVANCE access mode to update pod code. Press the appropriate box to initiate the download. Communications to a pod will be lost during and after the update. To regain communications, recycle power.
VPO
GAP
SCR
CV
NM6K
UPDATE
OPTIONS

Figure 4-20F. NM6000 Service Config Notebook Update Page

NOTE: When the key is pressed, the notebook disappears. Press the service config key to refresh the service config notebook.

4.20.33 After download is complete, exit from Service mode and cycle power.

4.20.34 Verify all pods display Pod Based Software version 1.06 and CRC value 1D1E.

4.20.35 Verify installation of pressure gauge option:
--Press the To Secondary Keys key on the main screen task bar.
--Press the Utilities key to open the Utilities notebook
--Touch the Pressure Gauge tab and verify that the pressure gauge option feature is enabled.
--Close the Pressure Gauge notebook.

4.20.36 Software Option Reconfiguration:

4.20.36.1 Audible O2 whistle:

If the machine is a CSA version with an audible O2 whistle, this feature must be activated after the processor is replaced. If the application software is v1.07 - 2.05, contact DMI's Technical Service Department to obtain instructions to enable and test this feature. If the application software version is ≥ 2.06 this feature must be re-enabled in the advanced service screen.

4.20.36.2 Low Flow Wizard:

If the machine is a DMI Demo unit or contains a Low Flow Wizard label near the serial number plate, this feature must be activated after the processor is replaced. If the software version is 1.06 - 2.05, contact DMI's Technical Service Department to obtain instructions to enable and test this feature. If the application software version is ≥ 2.06, this feature must be re-enabled in the advanced service screen.

4.20.36.3 Air-Only Mode:

If the machine contains an Air-Only Mode label near the serial number plate, this feature must be activated after the processor is replaced. If the software version is 2.05, contact DMI's Technical Service Department to obtain instructions to enable and test this feature. If the application software version is ≥ 2.06, this feature must be re-enabled in the advanced service screen.

4.20.36.4 Templates and Sounds:

If the machine contains a templates and sounds label near the serial number plate, this feature must be activated in the advanced service screen after the processor is replaced.

4.20.37 Perform the PMC Procedure given in Section 6.

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4.21 VPO Assembly

The VPO assembly comprises an L-shaped bracket that holds a PCB assembly, speakers, and the sensor interface connectors which project through clearance holes in the front panel of the machine. The communication port door must be opened for access to the VPO assembly. The mounting arrangement is shown in Figure 4-21. Audio wiring details are shown in the illustration at the end of this procedure.

4.21.1 Turn the System Power switch to STANDBY.

4.21.2 Remove AC power from the machine and pull all circuit breakers to their 'out' position.

4.21.3 Disconnect the breathing pressure line, flow sensor cord and O_2 sensor cord from the sensor interface panel on the front of the machine.

CAUTION: Use ESD protection when handling the VPO assembly. The PCB contains static sensitive devices.

4.21.4 Disconnect any external communication cables from the machine, and swing open the communication port door.

4.21.5 Disconnect the cables from the PCB on the VPO assembly. Mark or note their positions so that they can be reconnected to the replacement assembly in the same manner.

4.21.6 Remove the hardware securing the VPO assembly to the machine, and remove the assembly.

NOTE: Early model machines require a special long-reach tool (P/N 4115140) to remove the front mounting nuts

4.21.7 Position the replacement VPO assembly in the machine and secure it with the hardware that was previously removed.

4.21.8 Reconnect all of the cables that were previously disconnected.

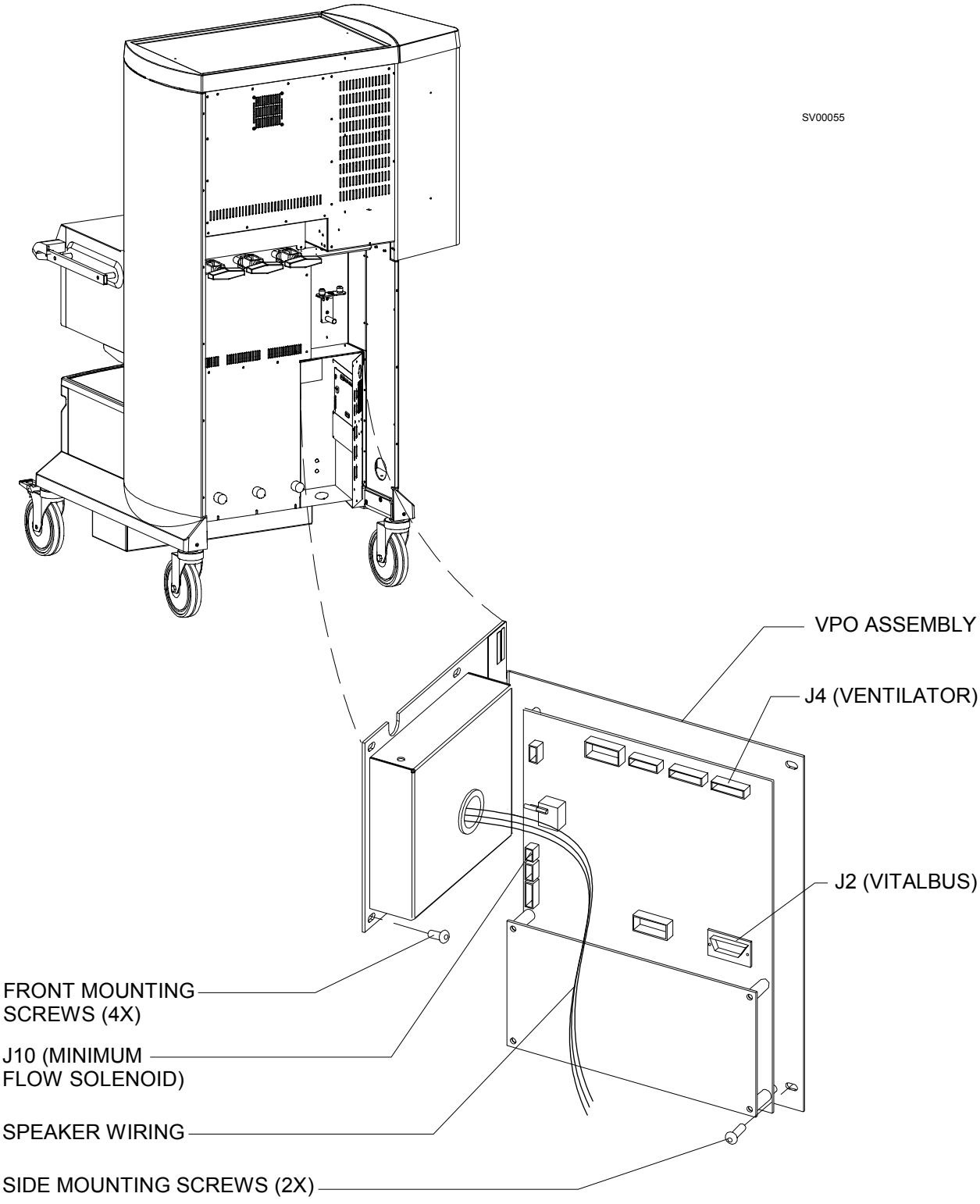


Figure 4-21. VPO Assembly

4.21.9 Close the communication port door and reconnect any cables that were previously disconnected.

4.21.10 Re-connect any Vitalbus Hub cables that may have been disconnected in the process. Ensure that the wire harness at J13 is oriented as described in the next step.

4.21.11 When re-attaching the 2-pin wire harness to the Vitalbus Hub at J13, verify its proper orientation. From the header connector the wires must route to the right as shown in Figure 4-21A, with the brown wire above the black wire.

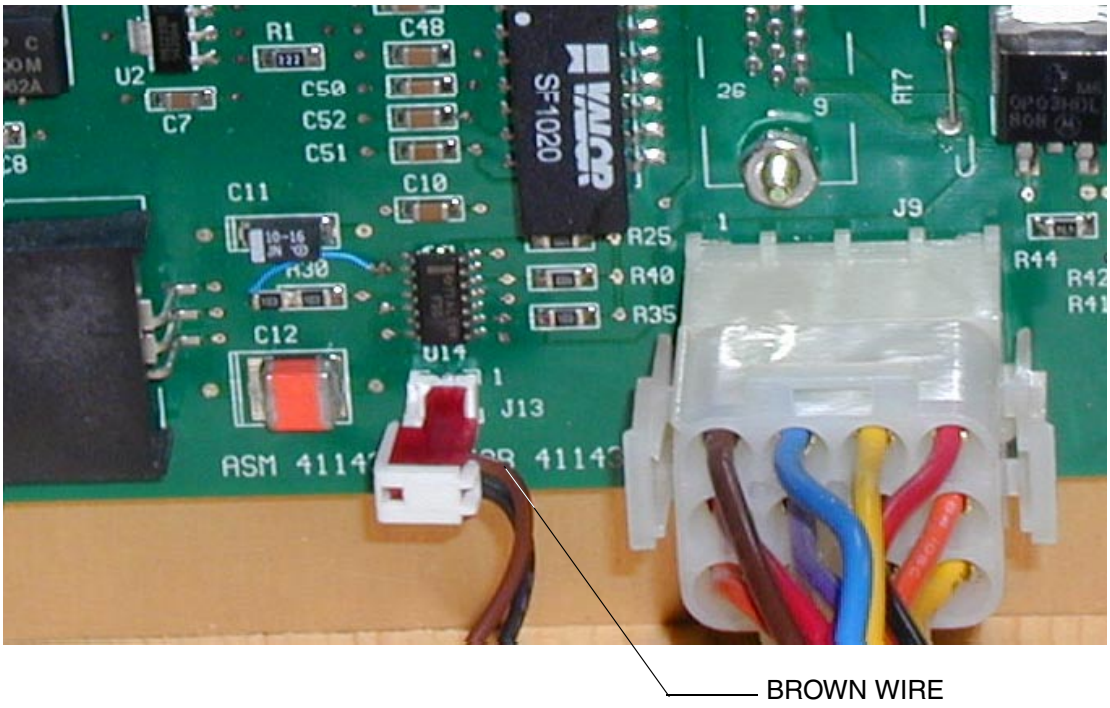


Figure 4-21A. J13 Connector Orientation

4.21.12 Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole directly above the power cord socket as shown in Figure 4-21B.

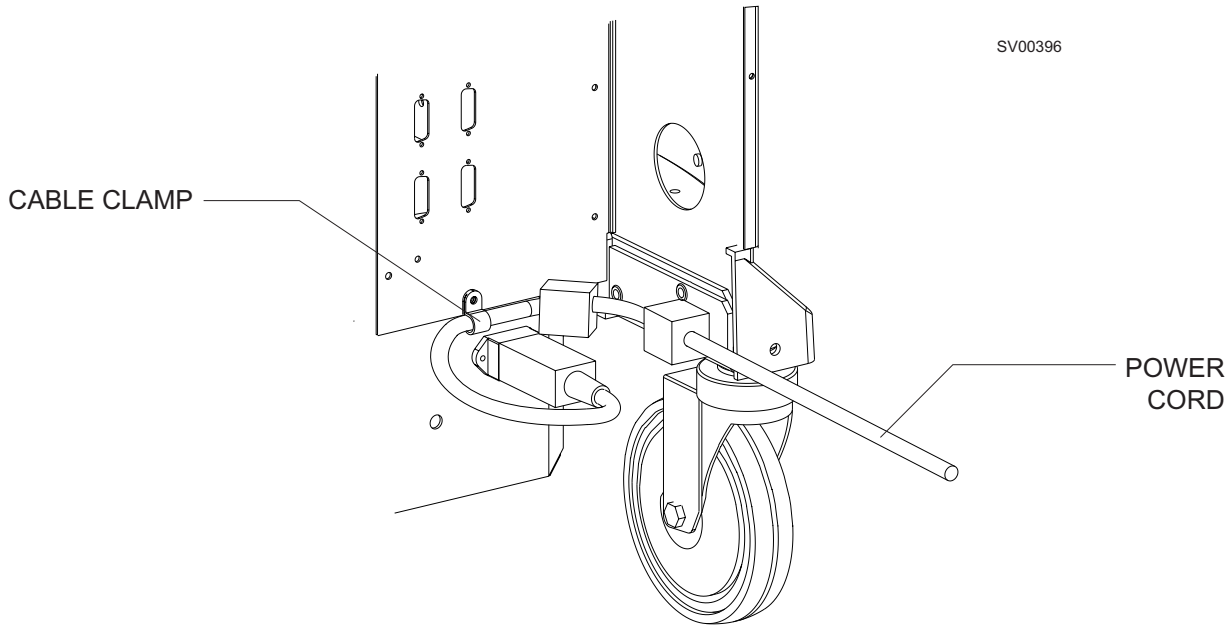


Figure 4-21B. Power Cord Routing

4.21.13 Reconnect the breathing pressure line, flow sensor cord and O_2 sensor cord to the sensor interface panel on the front of the machine.

4.21.14 Enable the circuit breakers and reconnect AC power to the machine.

4.21.15 Turn the System Power switch to ON and verify that the power-up self test is successfully completed.

4.21.16 Access the Primary Service Screen. (Refer to Accessing the Service Screens in Section 2.1 of this manual.)

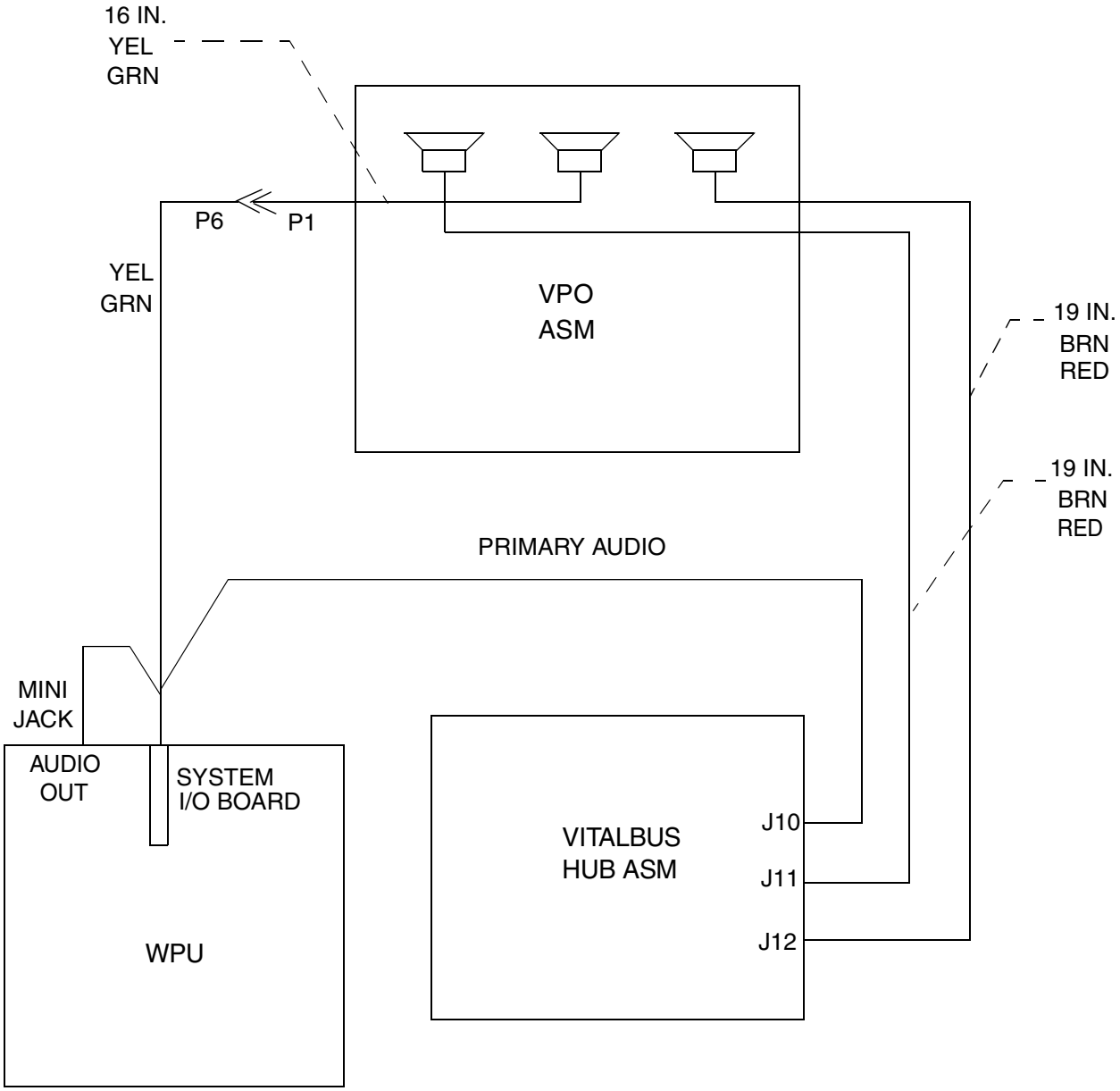
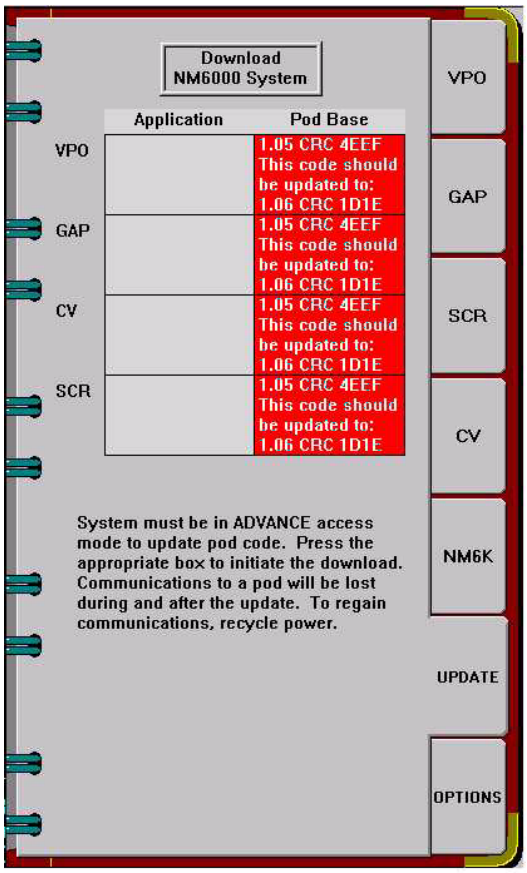


Figure 4-21C. Audio Wiring

4.21.17 Access the Advanced Service Mode. (refer to Accessing the Service Screens in Section 2.2 of this manual.) Select Service Config key, NM6K tab, select the SERVICE button and enter your Technicians ID#.

4.21.18 Touch the Update tab in the NM6000 CONFIGURATION to access the UPDATE page. (Refer to Update Page in Section 2.4.2 of this manual.) Press the VPO Pod Base key to initiate the POD Base download. See illustration.

NOTE: When the key is pressed, the notebook disappears. Press the service config key to refresh the service config notebook.


Download NM6000 System
Application
Pod Base
VPO
GAP
CV
SCR
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
System must be in ADVANCE access mode to update pod code. Press the appropriate box to initiate the download. Communications to a pod will be lost during and after the update. To regain communications, recycle power.
VPO
GAP
SCR
CV
NM6K
UPDATE
OPTIONS

4.21.19 After download is complete, exit from Service mode and cycle power.

4.21.20 Verify the VPO pod displays Pod Based Software version 1.06 and CRC value 1D1E.

4.21.21 Perform the PMC Procedure given in Section 6.

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4.22 Vitalbus Hub PCB Assembly

The vitalbus hub assembly includes the hinged door at the back of the machine, comm port connectors, AC convenience receptacle, fan, and PCB assembly The arrangement is shown in Figure 4-22. Following is the sequence for replacement of the PCB assembly.

NOTE: If the machine has a later design WPU with one communication port, the Vitalbus assembly will have an iso port arrangement with alternate connections to the WPU. Refer to Figure 4-22A for cable connection details.

4.22.1 Turn the System Power switch to STANDBY.

4.22.2 Remove AC power from the machine and pull all circuit breakers to their 'out' position.

CAUTION: Use ESD protection when handling the PCB assembly. The PCB contains static sensitive devices.

4.22.3 Disconnect any external communication cables from the connectors on the vitalbus assembly door, and swing open the door.

4.22.4 Disconnect the cables from the vitalbus hub PCB assembly. Mark or note their positions so that they can be reconnected to the replacement assembly in the same manner.

NOTE: Verify that the power supply wire harness from power supply J3 to the Vitalbus hub has a ferrite core noise suppression filter at the power supply end. If not, install a filter (P/N 4115155, split design) on the wire harness 1¼ in. from the power supply connector. Install a tie strap on either side of the filter to keep it in place.

4.22.5 Remove the assembly from the machine at the hinge.

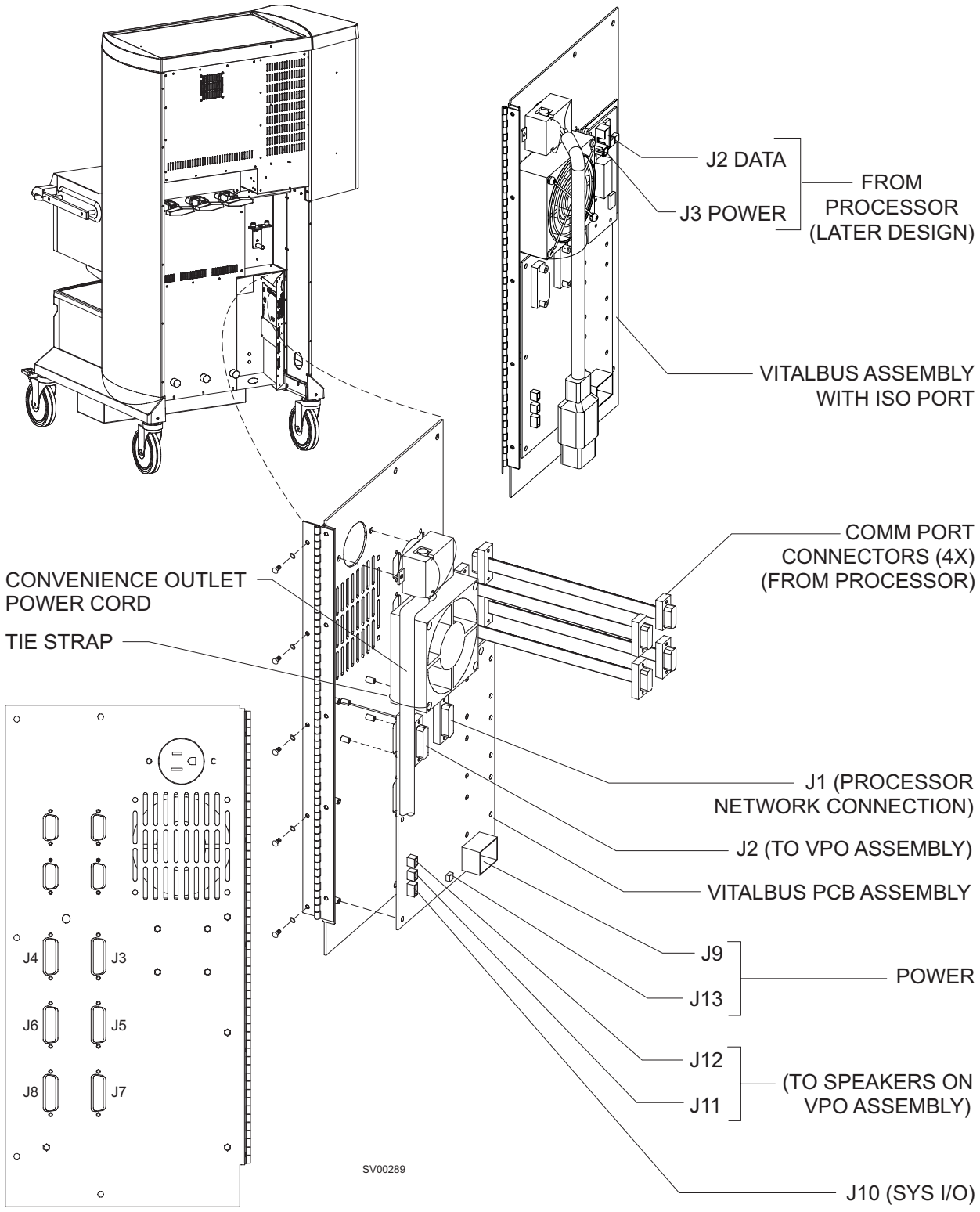

Figure 4-22. Vitalbus Hub Assembly

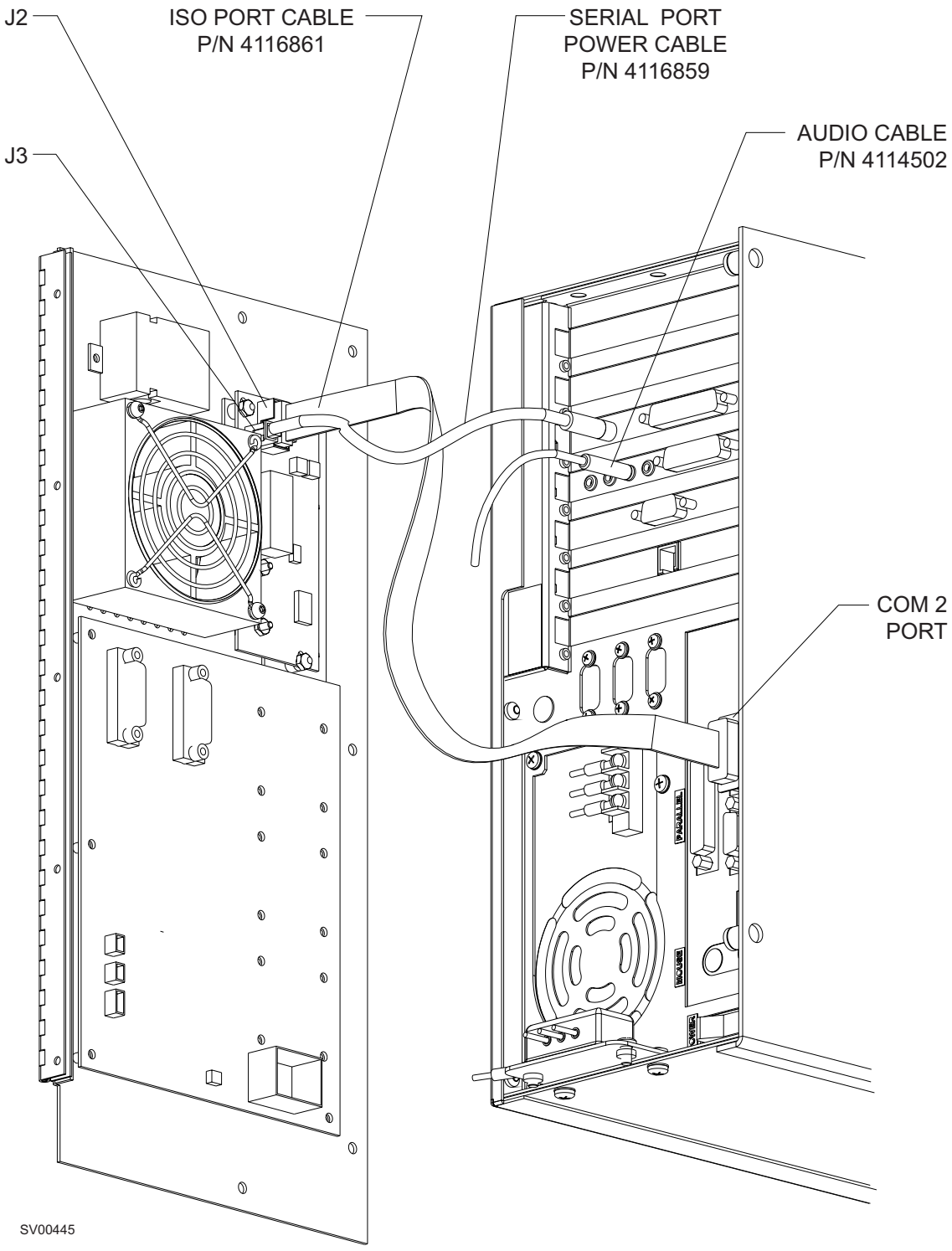

Figure 4-22A. Iso Port Cable Connections

4.22.6 Install the replacement assembly with the hardware that was previously removed.

NOTE: Ensure that the convenience outlet power cord is routed down along the side of the fan, and away from electronic components on the PCB.

4.22.7 When re-attaching the 2-pin wire harness to the Vitalbus Hub at J13, verify its proper orientation. From the header connector the wires must route to the right as shown in Figure 4-22B, with the brown wire above the black wire.

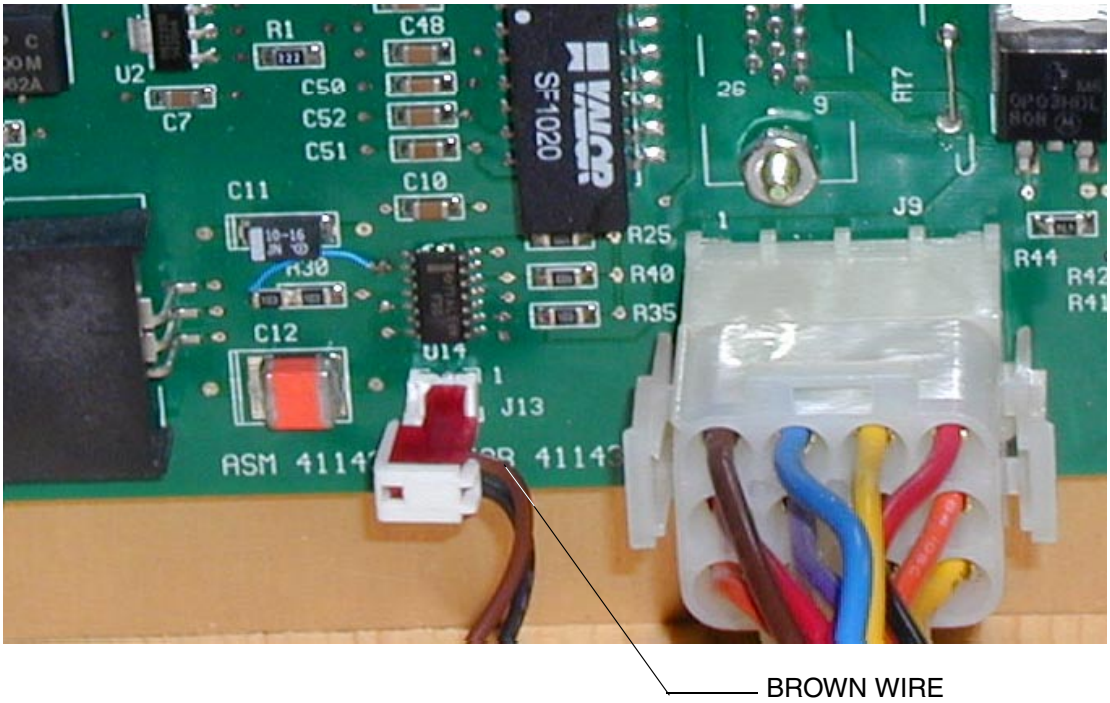

Figure 4-22B. J13 Connector Orientation

4.22.8 Close the vitalbus assembly door and reconnect any cables that were previously disconnected.

4.22.9 Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole dirrectly above the power cord socket as shown in Figure 4-22C.

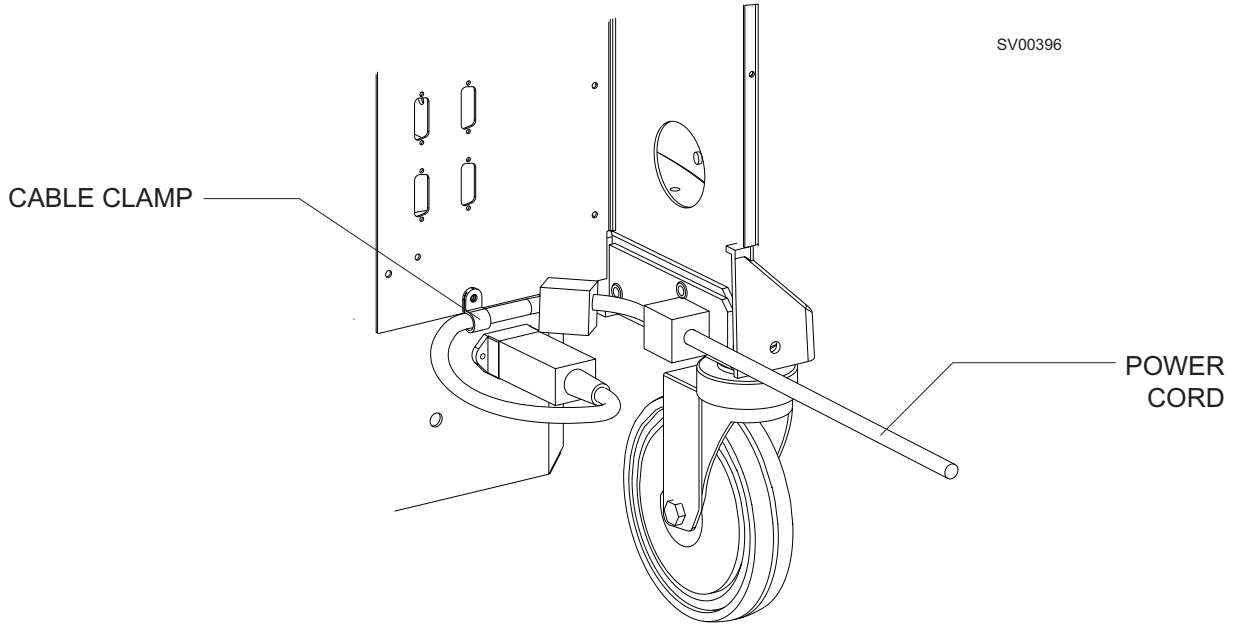

Figure 4-22C. Power Cord Routing

4.22.10 Enable the circuit breakers and reconnect AC power to the machine.

4.22.11 Turn the System Power switch to ON and verify that the power-up self test is successfully completed.

4.22.12 Verify that any devices connected to the vitalbus hub are working properly.

4.22.13 Perform the PMC Procedure given in Section 6.

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4.23 Agent Analyzer Assembly; Lithium Battery (TK-RAM IRIA) Replacement

The agent analyzer assembly is contained in a replaceable module that slides into an opening in the left (facing the front of the machine) side of the machine. Access to connections at the back of the module require removal of the flowmeter housing back cover. The general arrangement is shown in Figure 4-23.

CAUTION: All agent analyzers are shipped from DMI with the current version E-PROM and mechanical modifications. If the original analyzer part number is ≤ 4112970-005, upgrade 2.06 kit 4117240 must be installed to ensure proper system performance. If the machine is configured with an Integrated Patient Monitor (IPM), the part number of this pod must be 4113465-005. If the pod is of an earlier vintage, an updated IPM pod P/N SE4113465-005 and IPM Operator's Manual P/N 4116574-002 must be installed to ensure proper operation. If the original GAP part number can not be determined, use the Narkomed 6000 system software version to determine if the upgrade kit is required. All software versions < 2.06 must be updated. Refer to TSB 6007 for additional information.

4.23.1 Turn the System Power switch to STANDBY.

4.23.2 Disconnect the patient sample line at the water trap.

4.23.3 Remove the flowmeter housing back cover.

4.23.4 Disconnect the Vitalbus cable and the exhaust line at the back of the agent analyzer.

4.23.5 Loosen the captive mounting screw on the agent analyzer and remove the assembly from the machine.

4.23.6 For replacement of the lithium battery on the IRIA board:

CAUTION: Use ESD protection when servicing the analyzer assembly. Static discharge can damage PC board components.

4.23.6.1 Remove the cover from the analyzer assembly (four screws on the bottom, one screw at the back).

4.23.6.2 Loosen the two upper screws securing the left side panel of the analyzer, and swing open the panel as shown in the illustration.

4.23.6.3 Locate the lithium battery at the upper right corner of the IRIA board, and *carefully* release the clips securing the battery to the I.C. Do not damage the PC board.

4.23.6.4 Install the replacement battery onto the I.C. - oriented the same as the original battery. Press the IC firmly into its corresponding socket and verify its retaining clips are engaged.

4.23.6.5 Close the left side of the analyzer and tighten the retaining screws.

NOTE: The following procedure must be performed after replacement of the IRIA Time Keeper battery to prevent corruption of the IRIA pod log:

The following items are needed for the IRIA pod log verification:
-- Vitalbus cable, P/N 4113065-001
-- IRIA Download cable, P/N 4115443
-- Service laptop with IRIA.EXE, H_IRIA.TXT, IRIA_HEL.TXT, and IRIA.CFG.
*Place these files in C:\NAD software\nm6k\IRIA time
Create the folders where needed.

* these files can be obtained via Lotusnotes software bulletin board or by contacting Draeger Medical, Inc., Technical Service Department.

4.23.6.5A Unplug the AC power cord and disable all machine circuit breakers.

4.23.6.5B Disconnect the 10-conductor ribbon cable from the IRIA PCB assembly.

CAUTION: Before connecting an external computer to the IRIA, verify the computer is running a virus protection application set to scan all files and is enabled. You must also verify that the definition files and scan engines are of current vintage.

4.23.6.5C Attach the 10-conductor ribbon connector of the IRIA Download cable to the IRIA PCB assembly.

4.23.6.5D Connect the DB9 end of the Download cable to the COM1 port of the laptop computer.

4.23.6.5E Connect the additional Vitalbus cable to the existing vitalbus cable, then attach the extended cable assembly to the Gap's Vitalbus port.

4.23.6.5F Restore AC power to the machine and enable the circuit breakers.

NOTE: The machine must remain at STANDBY during this test.

4.23.6.5G Turn on the laptop and execute the Iria.exe application.

4.23.6.5H Information displayed on the laptop should appear as shown in Figure 4-23A.

4.23.6.5I Locate the Date field in the box at the upper right of the screen. Verify the displayed date is a valid calendar date and is NOT being displayed in Hexadecimal.
Date field= day. month. Year

4.23.6.5J Locate the Time field in the box at the upper right of the screen. Verify the displayed time is correctly showing seconds and minutes.
Time= Hours. Minutes. Seconds

4.23.6.5K If the Time and Date are correct, skip to Step 4.23.6.5Q.

4.23.6.5L If either the Time or Date fields are corrupted, press the F2 key. An additional box will appear in the upper left of the screen as shown in Figure 4-23B.

4.23.6.5M Scroll down to Set time and press Enter.

4.23.6.5N Enter the correct time and date as follows:
hh.mm.ss : dd.mm.jj

h= hours	d= day
m= minute	m= month
s= second	j= year

4.23.6.5P Verify the correct date is now displayed and that seconds and minutes are properly incrementing.

4.23.6.5Q Press ESC to exit and press Y to confirm you want to quit the program.

4.23.6.5R Turn off the laptop, unplug the machine AC power cord and disable all circuit breakers.

4.23.6.5S Remove the Download and Vitalbus cables.

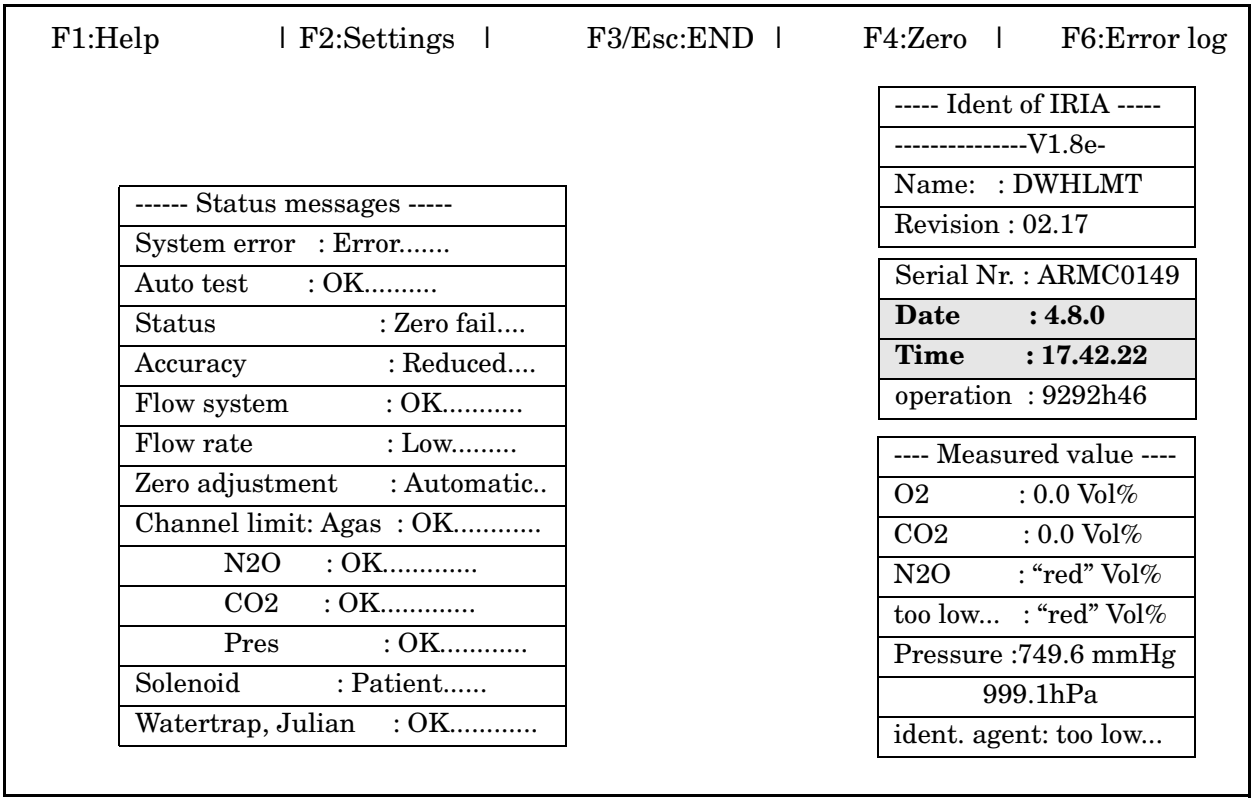


Figure 4-23A.

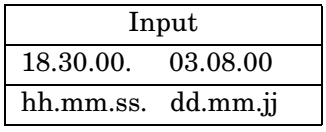


Figure 4-23B.

4.23.6.6 Reinstall the cover on the analyzer.

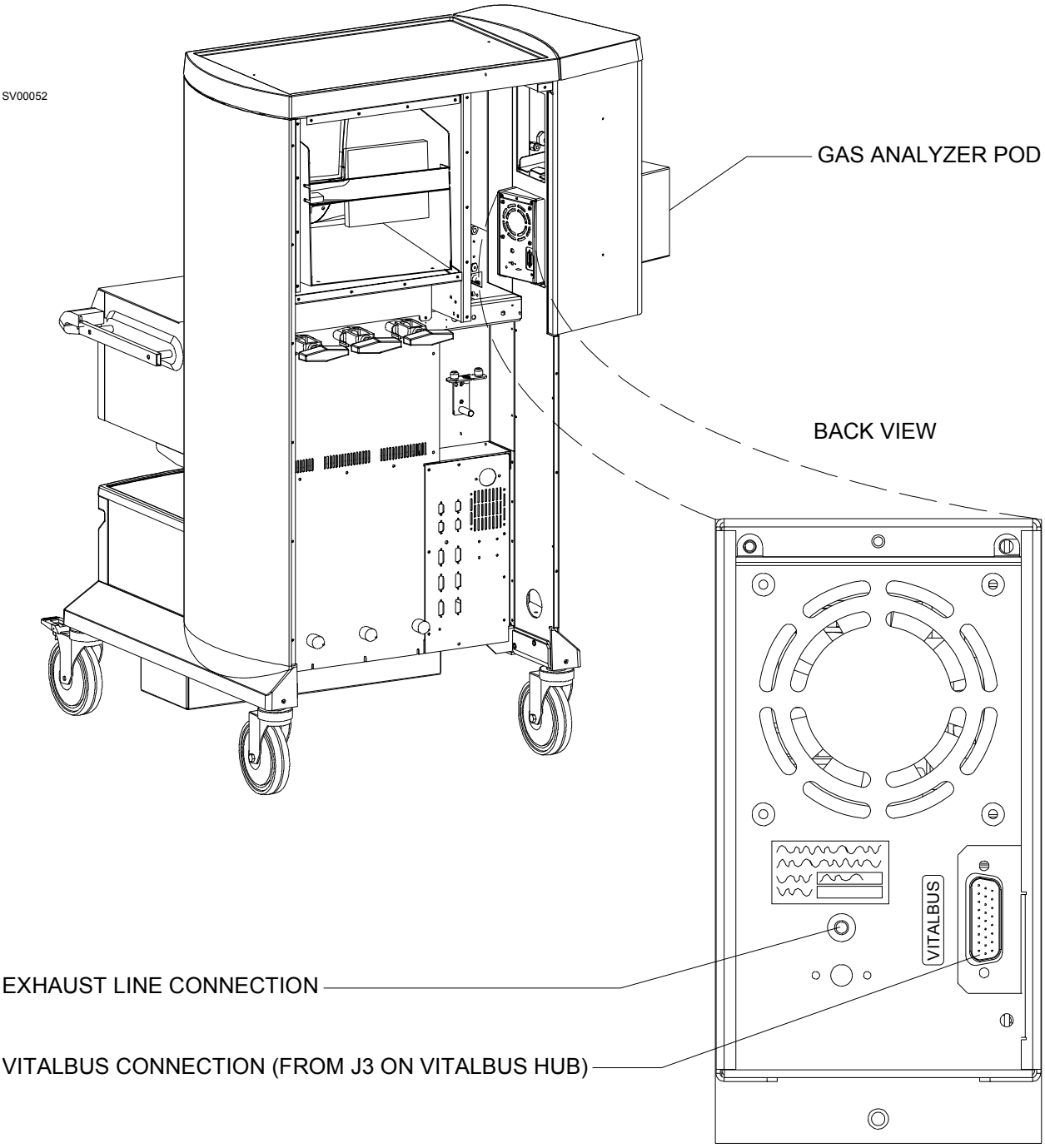


Figure 4-23. Agent Analyzer Assembly

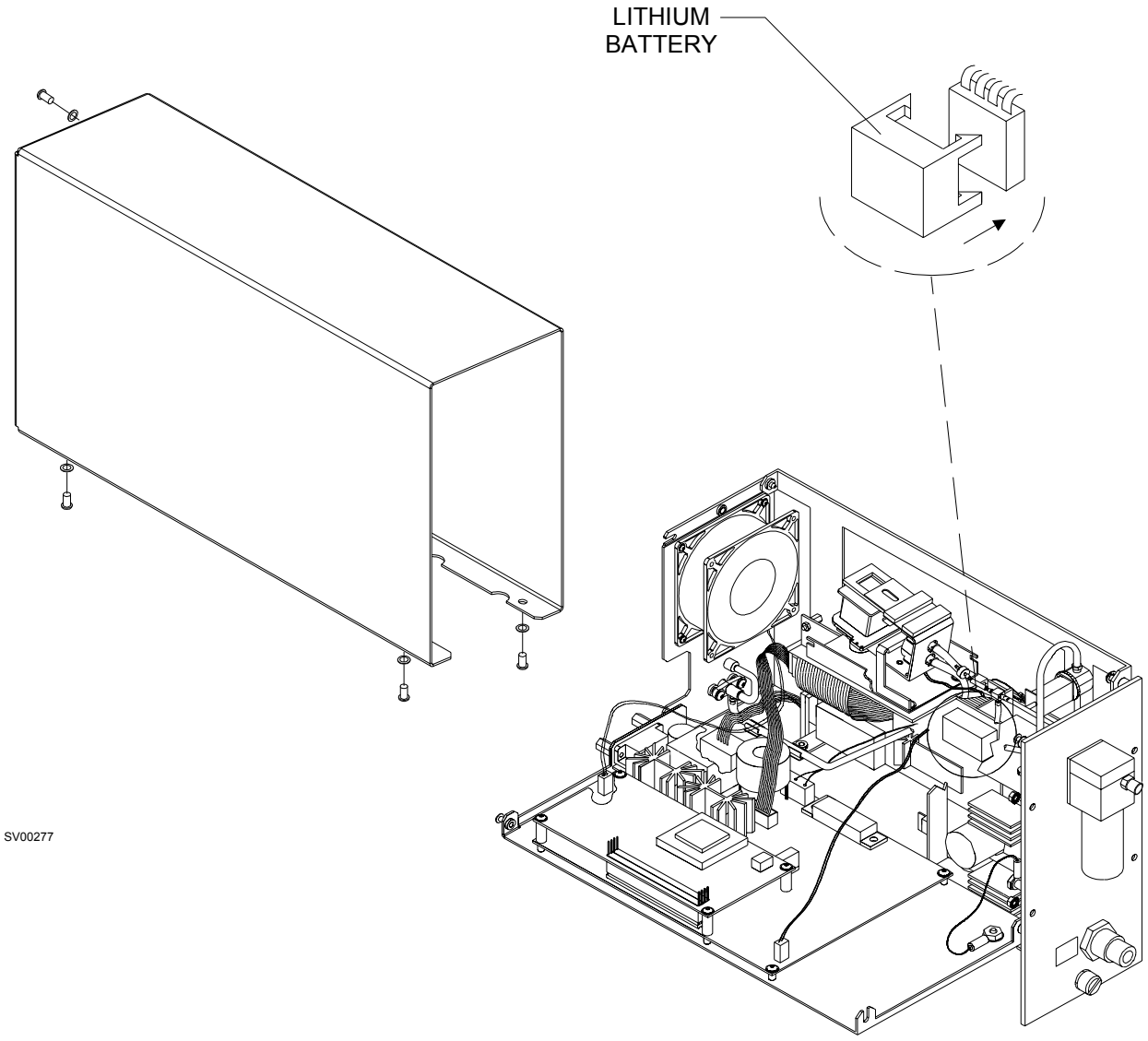


Figure 4-23 continued: Lithium Battery Replacement

4.23.7 Slide the replacement analyzer into the machine and secure it with its captive mounting screw.

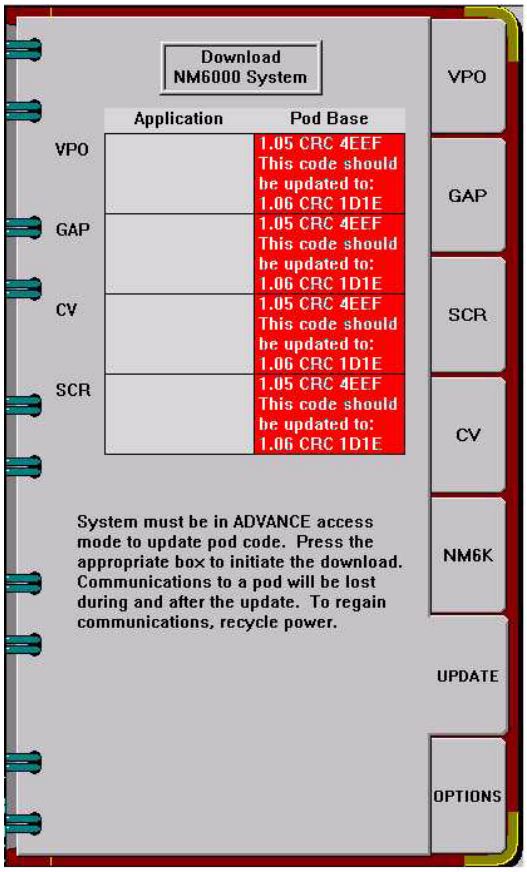
4.23.8 Reconnect the Vitalbus cable at the back of the analyzer.

4.23.9 Perform the agent analyzer flow rate adjustment given in Section 5.

4.23.10 Access the Primary Service Screen. (Refer to Accessing the Service Screens in Section 2.1 of this manual.)

4.23.11 Access the Advanced Service Mode. (refer to Accessing the Service Screens in Section 2.2 of this manual.) Select Service Config key, NM6K tab, select the SERVICE button and enter your Technicians ID#.

4.23.12 Touch the Update tab in the NM6000 CONFIGURATION to access the UPDATE page. (Refer to Update Page in Section 2.4.2 of this manual.) Press the GAP Pod Base key to initiate the POD Base download. See illustration.


Download NM6000 System
Application
Pod Base
VPO
GAP
CV
SCR
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
System must be in ADVANCE access mode to update pod code. Press the appropriate box to initiate the download. Communications to a pod will be lost during and after the update. To regain communications, recycle power.
VPO
GAP
SCR
CV
NM6K
UPDATE
OPTIONS

NOTE: When the key is pressed, the notebook disappears. Press the service config key to refresh the service config notebook.

4.23.13 After download is complete, exit from Service mode and cycle power.

4.23.14 Verify the GAP pod displays Pod Based Software version 1.06 and CRC value 1D1E.

4.23.15 Reconnect the exhaust line at the back of the analyzer.

4.23.16 Reinstall the flowmeter housing back cover.

4.23.17 Perform the PMC Procedure given in Section 6.

4.23A Agent Analyzer Pump Assembly Replacement

CAUTION: Use ESD protection when servicing the analyzer assembly. Static discharge can damage PCB components.

4.23A.1 Turn the System Power switch to STANDBY.

4.23A.2 Disconnect the semi-permeable tube from the water trap.

4.23A.3 Loosen the captive screw on the analyzer and slide the assembly out far enough to gain access to its exhaust hose and data cable connection. See Figure 4-23.

4.23A.4 Disconnect the Vitalbus cable and the exhaust hose at the back of the analyzer.

4.23A.5 Remove the cover from the analyzer assembly (four or six screws on the bottom, one screw at the back).

4.23A.6 Loosen the two upper screws securing the left panel of the analyzer, and swing open the panel.

4.23A.7 Disconnect the pump power cable from J2 on the GAP personality PCB.

4.23A.8 Compress and slide back the hose clamps securing the tubes to the pump, and remove the tubes from the pump. See following illustration.

4.23A.9 Remove the screws and washers securing the pump to its mounting bracket.

4.23A.10 Install the new pump and secure it to the bracket using the screws and lockwashers previously removed.

4.23A.11 Connect the hose from the damper assembly to the pump port marked ‘Input’. Compress and slide the hose clamp back into position.

Connect the hose from the variable restrictor to the pump’s unmarked port. Compress and slide the hose clamp back into position.

4.23A.12 Reconnect the pump power cable to J2 on the GAP personality PCB.

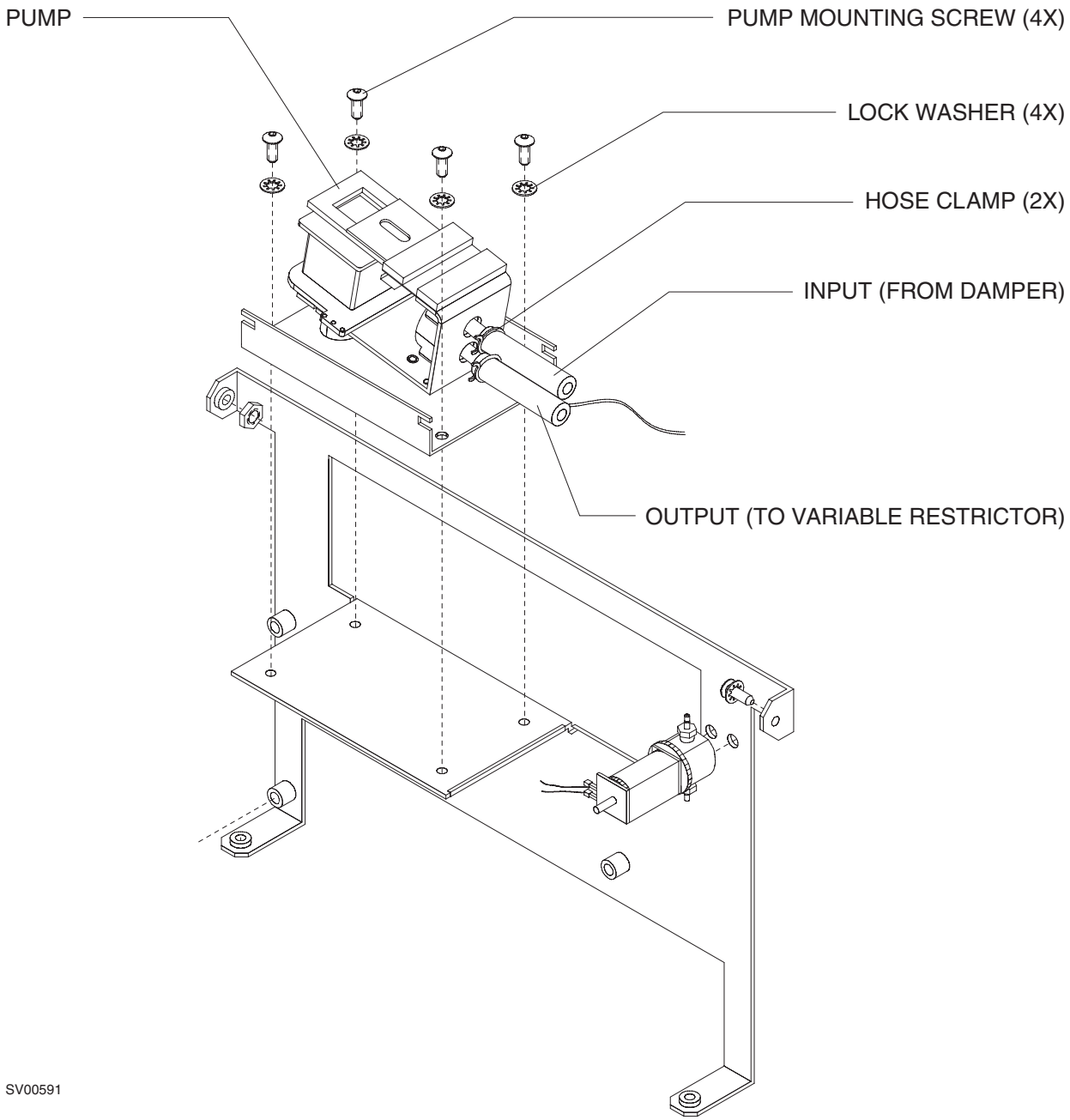
4.23A.13 Close the panel at the left side of the analyzer and tighten the retaining screws.

4.23A.14 Reinstall the cover on the analyzer.

4.23A.15 Reconnect the Vitalbus cable and exhaust line at the back of the analyzer.

4.23A.16 Slide the analyzer into the machine and secure it with its captive screw.

4.23A.17 Perform the Agent Monitor Sample Flow Calibration given in Section 5. Perform the PMC procedure given in Section 6.



Agent Analyzer Pump Replacement

4.23B Agent Analyzer IRIA Sensor Head Replacement

CAUTION: Use ESD protection when servicing the analyzer assembly. Static discharge can damage PCB components.

4.23B.1 Turn the System Power switch to STANDBY.

4.23B.2 Disconnect the semi-permeable tube from the water trap.

4.23B.3 Loosen the captive screw on the analyzer and slide the assembly out far enough to gain access to its exhaust hose and data cable connection. See Figure 4-23.

4.23B.4 Disconnect the Vitalbus cable and the exhaust hose at the back of the analyzer.

4.23B.5 Remove the cover from the analyzer assembly (four or six screws on the bottom, one screw at the back).

4.23B.6 Loosen the two upper screws securing the left panel of the analyzer, and swing open the panel.

4.23B.7 Locate the original IRIA S/N and record its serial number on the report. See following illustration.

4.23B.8 Disconnect the red tube from the side port of the chrome T-fitting leading to the damper. Disconnect the small clear tube from the IRIA gas analyzer.

CAUTION: Do Not disturb the red tube leading into the side of the IRIA.

4.23B.9 Remove the two screws securing the damper canister to the IRIA.

4.23B.10 Disconnect the data cable from the IRIA.

4.23B.11 Remove the four screws and lock washers securing the IRIA and carefully lift the assembly from the chassis.

4.23B.12 Install the replacement IRIA with the four screws and washers previously removed.

4.23B.13 Record the new IRIA serial number on the service call report.

4.23B.14 Reconnect the data cable to the IRIA.

4.23B.15 Reinstall the damper canister using the hareware previously removed. Ensure that the lower solenoid tube connection is routed behind the damper canister.

4.23B.16 Reconnect the IRIA input and output tubes to their previous locations.

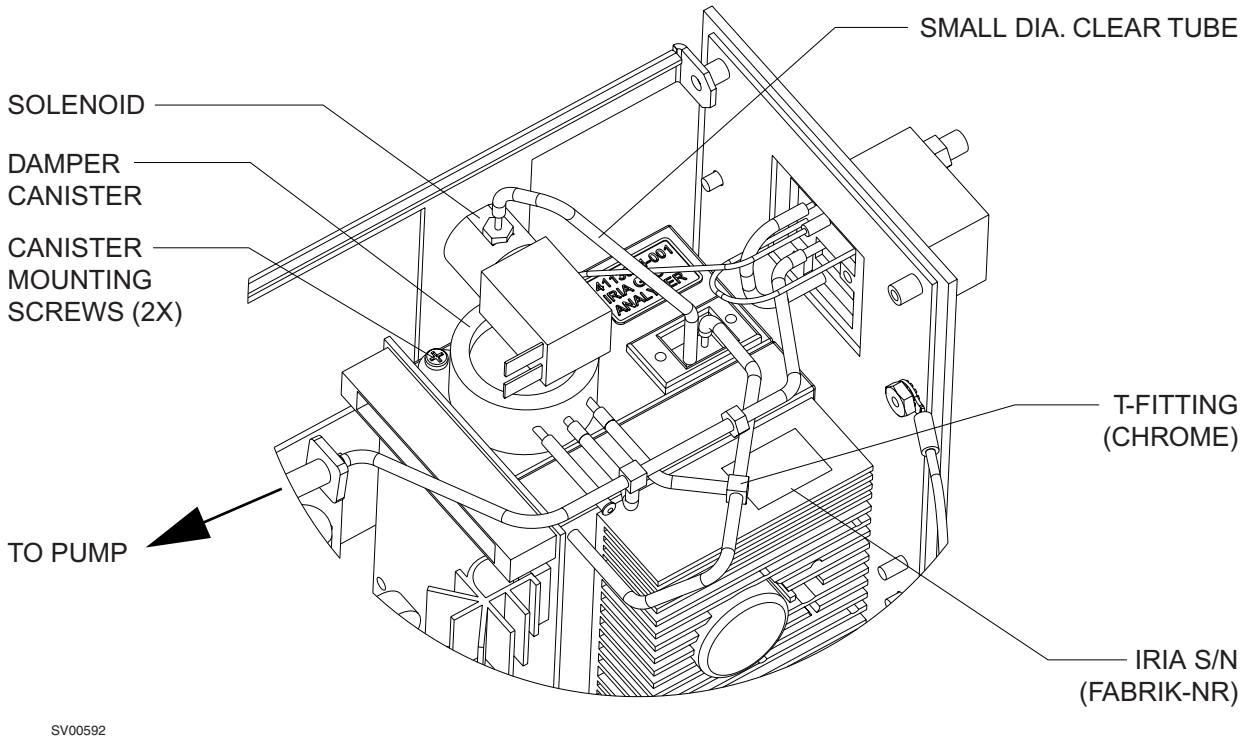
4.23B.17 Close the panel at the left side of the analyzer and tighten the retaining screws.

4.23B.14 Reinstall the cover on the analyzer.

4.23B.15 Reconnect the Vitalbus cable and exhaust line at the back of the analyzer.

4.23B.16 Slide the analyzer into the machine and secure it with its captive screw.

4.23B.17 Perform the Agent Monitor Sample Flow Calibration given in Section 5. Perform the PMC procedure given in Section 6.



Agent Analyzer IRIA Sensor Head Replacement

4.23C Gap Personality PCB, GAI Firmware & Common Processor PCB Replacement

CAUTION: Use ESD protection when servicing the analyzer assembly. Static discharge can damage PCB components.

4.23C.1 Turn the System Power switch to STANDBY.

4.23C.2 Disconnect the semi-permeable tube from the water trap.

4.23C.3 Loosen the captive screw on the analyzer and slide the assembly out far enough to gain access to its exhaust hose and data cable connection. See Figure 4-23.

4.23C.4 Disconnect the Vitalbus cable and the exhaust hose at the back of the analyzer.

4.23C.5 Remove the cover from the analyzer assembly (four or six screws on the bottom, one screw at the back).

4.23C.6 Loosen the two upper screws securing the left panel of the analyzer, and swing open the panel.

If replacing the GAI firmware PROM, remove the existing PROM (U3) from its socket on the GAP personality PCB assembly. Peel back the IC's label to verify the location of its dimple. Orient the firmware as shown in the illustration on the next page and insert it firmly into the socket. Skip to Step 4.23C.17 if only replacing the E-PROM.

4.23C.7 Locate the shield covering the common processor PCB. Remove the four screws, four lock washers and eight spacers, then remove the shield. See following illustration.

4.23C.8 Gently rock the common processor PCB back and forth while pulling up on the assembly, and carefully remove the assembly from the GAP personality PCB.

If you are only replacing the common processor, skip to Step 4.23C.16.

4.23C.9 Remove the following GAP personality PCB connections:

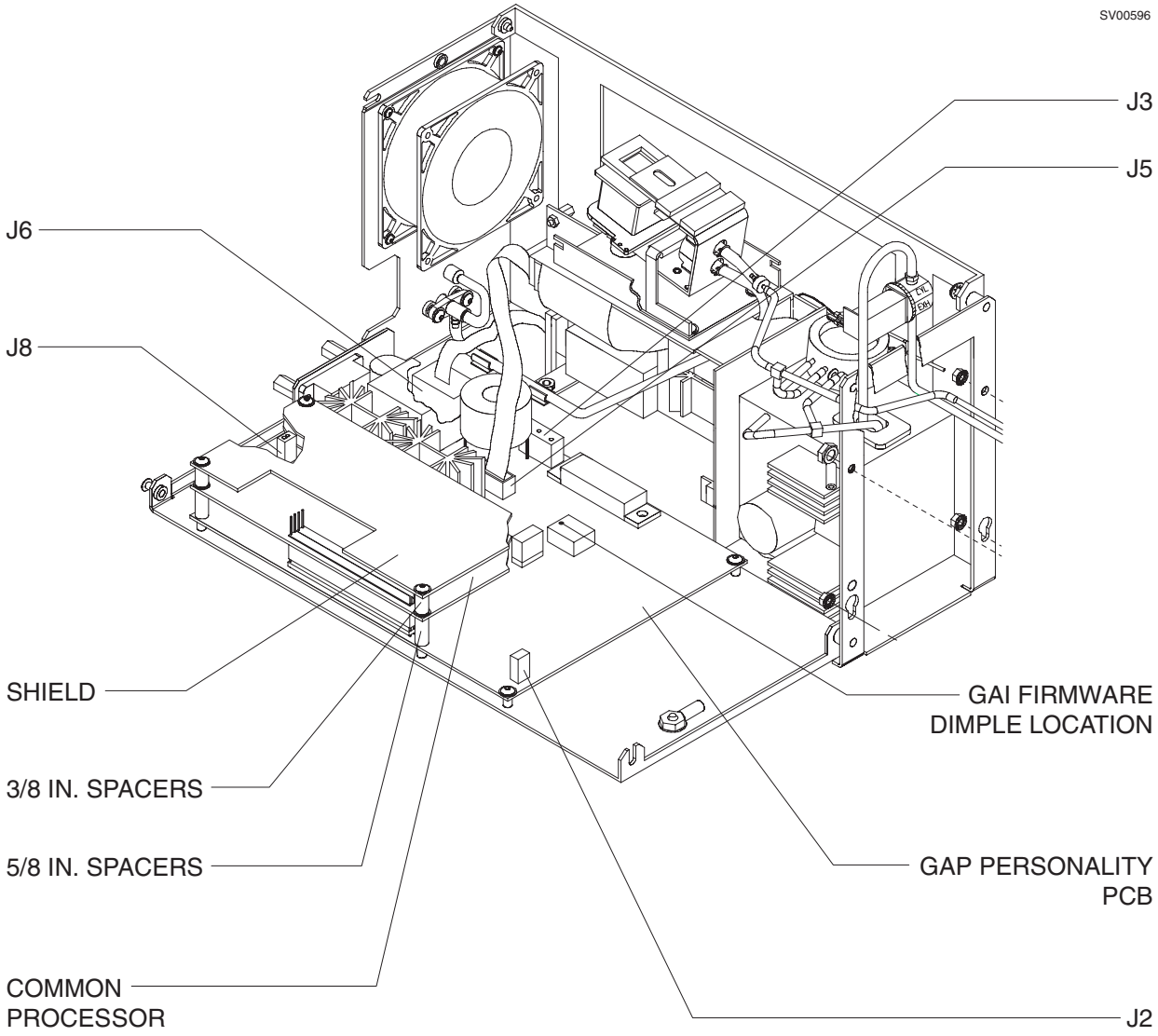
Pump @ J2, Solenoid @ J3, Data @ J5, IRIA PCB @ J6, Fan @ J8

4.23C.10 Remove the 7 screws and lock washers securing the GAP personality PCB to the chassis.

4.23C.11 Remove the standoffs and lock washers from the Vitalbus connector and remove the GAP personality PCB from the chassis.

4.23C.12 Align the new GAP personality PCB Vitalbus with the slot in the chassis and reinstall the standoffs and lock washers.

4.23C.13 Secure the GAP personality PCB to the chassis with the 7 screws and washers previously removed.



Gap Personality PCB & Common Processor PCB Replacement

4.23C.14 Reconnect the following items to the GAP personality PCB:

Pump @ J2, Solenoid @ J3, Data @ J5, IRIA PCB @ J6, Fan @ J8

4.23C.15 Note the location of the 2-position shunt at JP6 on the original PCB, then transfer this shunt to the same location on the new PCB.

4.23C.16 Align the common processor PCB socket to the corresponding pins on the GAP personality PCB and carefully press fit the PCBs together.

CAUTION: Make certain that the common processor PCB is fully seated onto the GAP personality PCB. There should not be more than 1/16 in. of pins exposed between the PCBs.

4.23C.17 Reinstall the four 5/8 in. spacers between the common processor PCB and the GAP personality PCB.

4.23C.18 Reinstall the screws, lock washers, shield and 3/8 in. spacers onto the PCBs.

4.23C.17 Close the panel at the left side of the analyzer and tighten the retaining screws.

4.23C.14 Reinstall the cover on the analyzer.

4.23C.15 Reconnect the Vitalbus cable and exhaust line at the back of the analyzer.

4.23C.16 Slide the analyzer into the machine and secure it with its captive screw.

4.23C.17 Perform the Agent Monitor Sample Flow Calibration given in Section 5. Perform the PMC procedure given in Section 6.

4.23D IRIA Controller PCB Replacement

CAUTION: Use ESD protection when servicing the analyzer assembly. Static discharge can damage PCB components.

4.23D.1 Turn the System Power switch to STANDBY.

4.23D.2 Disconnect the semi-permeable tube from the water trap.

4.23D.3 Loosen the captive screw on the analyzer and slide the assembly out far enough to gain access to its exhaust hose and data cable connection. See Figure 4-23.

4.23D.4 Disconnect the Vitalbus cable and the exhaust hose at the back of the analyzer.

4.23D.5 Remove the cover from the analyzer assembly (four or six screws on the bottom, one screw at the back).

4.23D.6 Loosen the two upper screws securing the left panel of the analyzer, and swing open the panel.

4.23D.7 Disconnect the large data cable from the IRIA sensor head. See following illustration.

4.23D.8 Disconnect the small data cable from the IRIA controller PCB.

4.23D.9 Disconnect the power cable from the IRIA controller PCB.

4.23D.10 For access to the IRIA controller PCB mounting hardware, remove the two button head screws securing the hinged side cover.

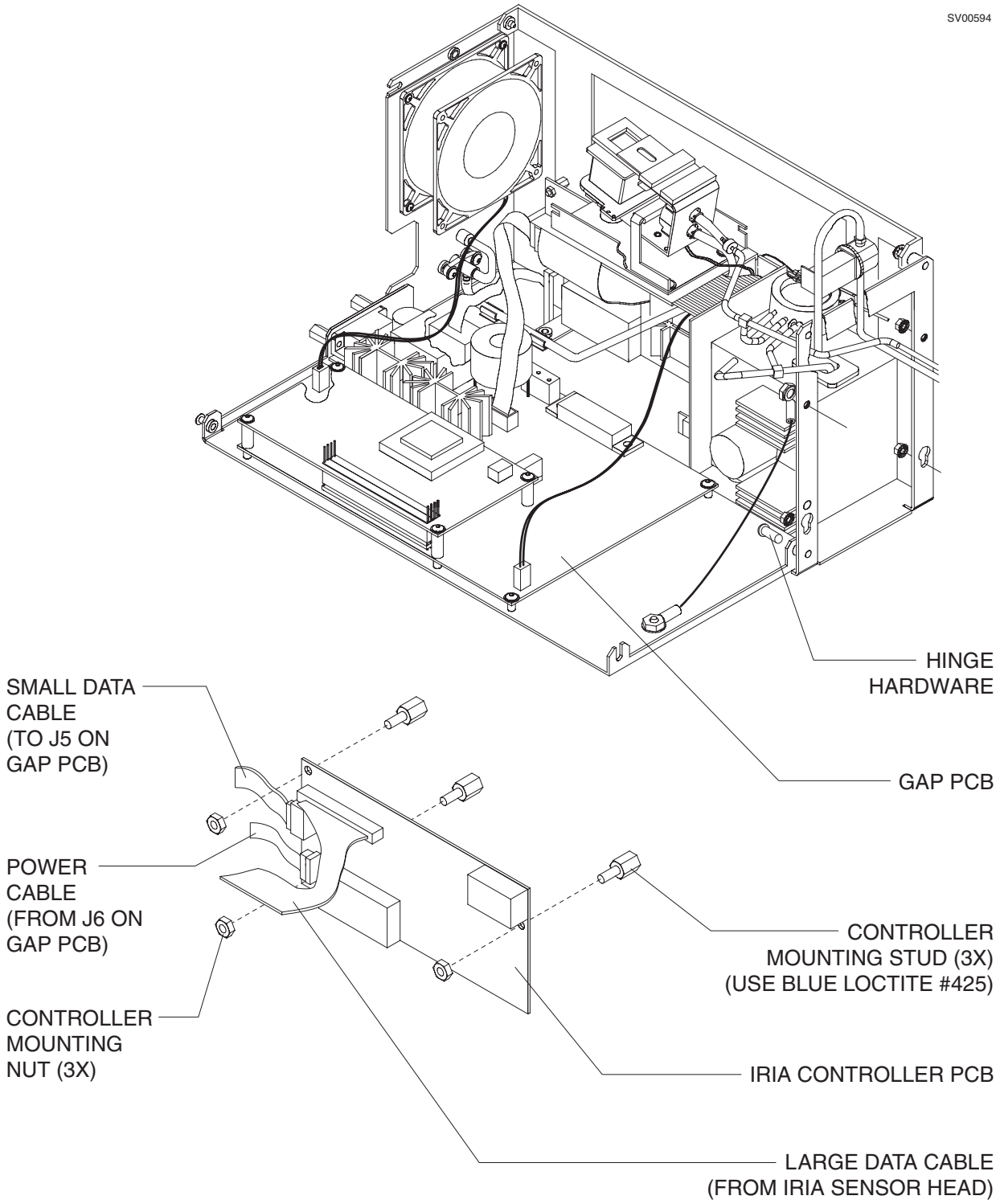
4.23D.11 Remove the three retaining nuts or standoffs securing the IRIA controller to the chassis, then remove the assembly. Remove the standoffs from the PCB or chassis if they are still attached.

4.23D.12 Remove and discard the plastic spacers provided with the replacement controller PCB.

4.23D.13 Apply a minimal amount of Loctite #425 (blue) to the threads of each mounting stud, and reinstall the standoffs. Do Not over-tighten.

CAUTION: Do not use any other type of Loctite as damage to the plastic components may result.

4.23D.14 Mount the new IRIA controller PCB on the standoffs, then apply a minimal amount of Loctite #425 (blue) to the standoff threads and reinstall the retaining nuts. Do Not over-tighten.


SV00594
HINGE HARDWARE
GAP PCB
SMALL DATA CABLE (TO J5 ON GAP PCB)
POWER CABLE (FROM J6 ON GAP PCB)
CONTROLLER MOUNTING NUT (3X)
CONTROLLER MOUNTING STUD (3X) (USE BLUE LOCTITE #425)
IRIA CONTROLLER PCB
LARGE DATA CABLE (FROM IRIA SENSOR HEAD)

Iria Controller PCB Replacement

4.23D.15 Reinstall the two button head screws securing the lower hinged side cover.

4.23D.16 Reattach the power cable to the IRIA controller PCB.

4.23D.17 Reattach the small data cable to the IRIA controller PCB.

4.23D.18 Reattach the large data cable to the IRIA sensor head.

4.23D.19 Close the panel at the left side of the analyzer and tighten the retaining screws.

4.23D.14 Reinstall the cover on the analyzer.

4.23D.15 Reconnect the Vitalbus cable and exhaust line at the back of the analyzer.

4.23D.16 Slide the analyzer into the machine and secure it with its captive screw.

4.23D.17 Perform the Agent Monitor Sample Flow Calibration given in Section 5. Perform the PMC procedure given in Section 6.

4.23E Water Trap, Solenoid, Variable Restrictor Replacement & Retubing Procedure

CAUTION: Use ESD protection when servicing the analyzer assembly. Static discharge can damage PCB components.

4.23E.1 Turn the System Power switch to STANDBY.

4.23E.2 Disconnect the semi-permeable tube from the water trap.

4.23E.3 Loosen the captive screw on the analyzer and slide the assembly out far enough to gain access to its exhaust hose and data cable connection. See Figure 4-23.

4.23E.4 Disconnect the Vitalbus cable and the exhaust hose at the back of the analyzer.

4.23E.5 Remove the cover from the analyzer assembly (four or six screws on the bottom, one screw at the back).

4.23E.6 Loosen the two upper screws securing the left panel of the analyzer, and swing open the panel.

4.23E.7 Water trap replacement: Refer to following two illustrations.

4.23E.7.1 Remove Tube “A” from the water trap assembly.

4.23E.7.2 Remove Tube “B” from the water trap assembly.

4.23E.7.3 Remove the two Phillips head screws securing the water trap to the chassis.

4.23E.7.4 Install a replacement water trap assembly using the screws removed in the previous step.

4.23E.7.5 Install Tube “A” between the large port on the water trap and the brass restrictor.

4.23E.7.6 Slide Tube “B” over Tube “C” and connect this end to the small port on the water trap. Connect the other end to the “EXH” port at the bottom of the solenoid. Verify this tube is routed behind the damper.

4.23E.8 Solenoid replacement: Refer to the following two illustrations.

4.23E.8.1 Disconnect the two wires from the solenoid.

4.23E.8.2 Remove the two screws securing the solenoid to the chassis.

4.23E.8.3 Disconnect the tubes from the solenoid.

4.23E.8.4 Apply a minimal amount of Loctite #425 (blue) to the threads of the hose barbs and install them in the new solenoid. Do Not over-tighten.

CAUTION: Do not use any other type of Loctite as damage to the plastic components may result

4.23E.8.5 Connect Tube “C” between the water trap and the “EXH” port on the solenoid.

4.23E.8.6 Install Tube “D” between the solenoid “OUT” port and the IRIA sensor head port closest to the “⇒”.

4.23E.8.7 Install the solenoid with the “OUT” port facing up.

4.23E.8.8 Reconnect the two wires to the solenoid: brown wire above the red wire.

4.23E.9 Damper & Brass Restrictor Replacement: Refer to the following two illustrations.

4.23E.9.1 Disconnect the tube from the water trap side of the brass restrictor.

4.23E.9.2 Disconnect the tube from the pump inlet port.

4.23E.9.3 Disconnect the tube from the center port of the chrome T-fitting.

4.23E.9.4 Remove the screws securing the damper; remove the damper with its associated tubing.

4.23E.9.5 Install the new damper using the screws removed in the previous step.

4.23E.9.6 Reconnect the center port of the chrome T-fitting the right side port on the damper.

4.23E.9.7 Connect the center port of a new brass T-fitting to the center port of the damper.

4.23E.9.8 Connect a new brass restrictor to Tube “A”.

4.23E.9.9 Connect one end of Tube “E” to the brass restrictor. Connect the other end of this tube to the right side of the brass T-fitting.

4.23E.9.10 Connect Tube “F” to the remaining port of the brass T-fitting. Connect the other end to the reducer.

4.23E.9.11 Attach Tube “G” between the adapter and the pump port marked “INLET”. Secure this connection by re-using the clamp previously removed.

4.23.E.10 Variable Flow Restrictor Replacement: Refer to the following two illustrations.

4.23E.10.1 Remove the tube from the bottom port of the pump and remove it from the conduit.

4.23E.10.2 Remove the tube from the feed-through fitting.

4.23E.10.3 Remove the screws and washers securing the variable flow restrictor.

4.23E.10.4 Remove the jam nut and washer securing the feed-through fitting.

4.23E.10.5 Install a new feed-through fitting; secure it with a lock washer and jam nut.

4.23E.10.6 Install a new variable flow restrictor and secure it to the chassis with the lock washers and screws previously removed.

4.23E.10.7 Attach Tube “H” between the feen-through fitting and the side port of the variable flow restrictor.

4.23E.10.8 Attach Tube “I” between the bottom port of the variable flow restrictor and the bottom port of the pump. Secure the pump connection by re-using the clamp previously removed.

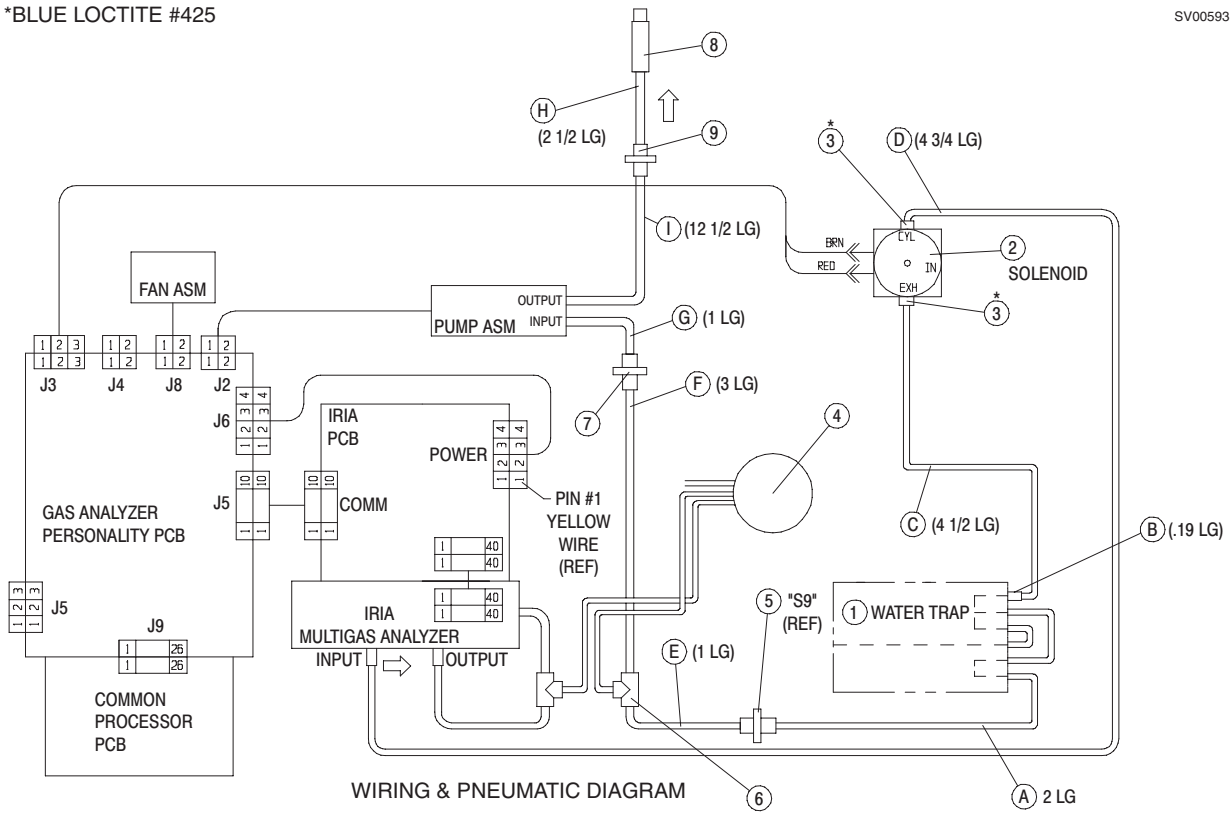
4.23E.11 Close the panel at the left side of the analyzer and tighten the retaining screws.

4.23E.12 Reinstall the cover on the analyzer.

4.23E.13 Reconnect the Vitalbus cable and exhaust line at the back of the analyzer.

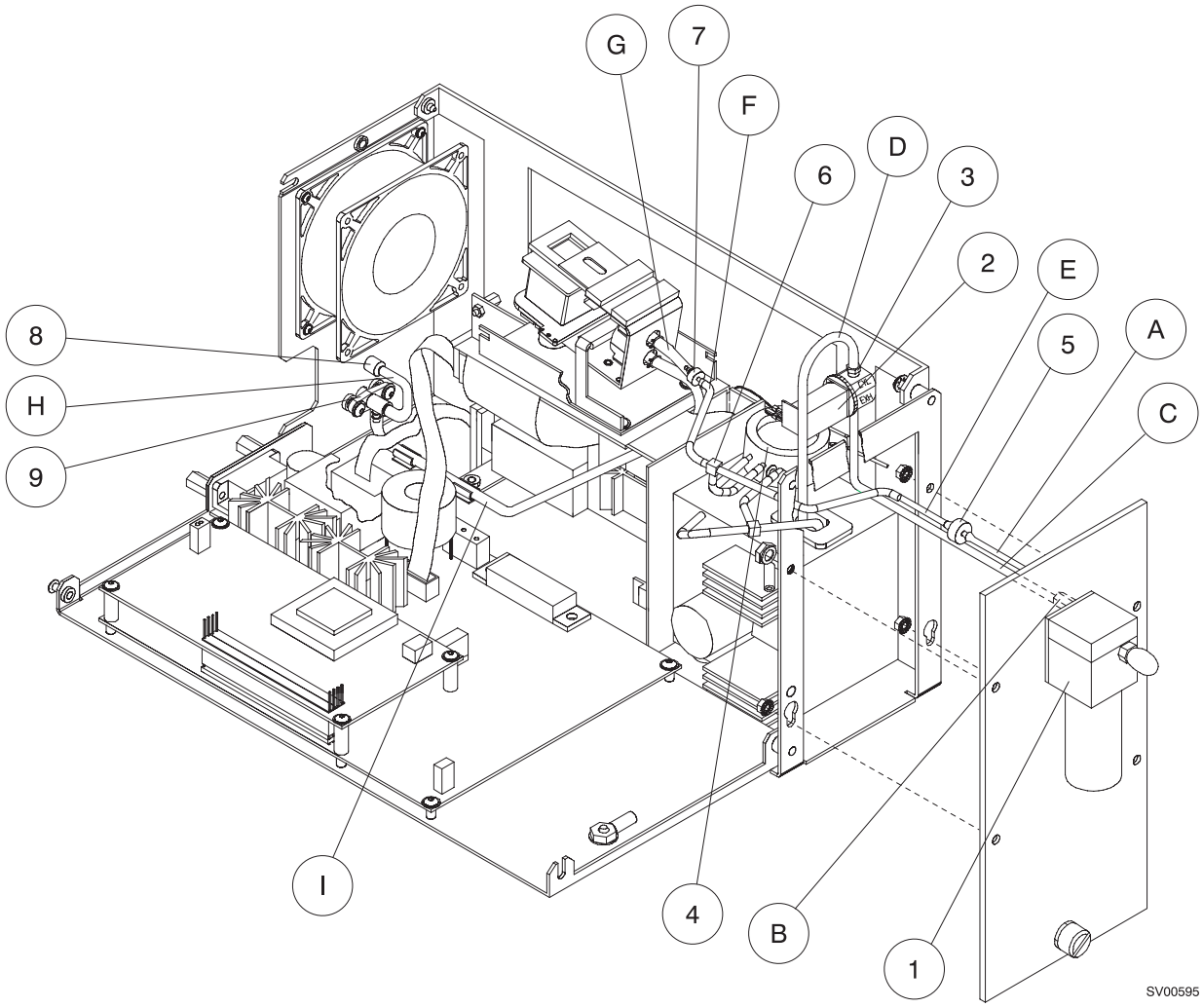
4.23E.14 Slide the analyzer into the machine and secure it with its captive screw.

4.23E.15 Perform the Agent Monitor Sample Flow Calibration given in Section 5. Perform the PMC procedure given in Section 6.



GAP Tubing Diagram

Item	Description	Qty	P/N	Item	Description	Qty	P/N
1	Water Trap	1	6870510	A	Hose, Natural 0.075ID x 0.03	2.0”	ML08003
2	Solenoid	1	4111377	B	Hose, Natural 0.075ID x 0.03	0.19”	ML08003
3	Ftg, Str 1/16 x 10-32 M	2	4114908	C	Hose, Clear 0.05ID x 0.020W	4.5”	ML08012
4	Damper Assembly	1	4117237	D	Hose, Clear 0.05ID x 0.020W	4.75”	ML08012
5	Restrictor, 80 mL/min.	1	4111758-006	E	Hose, Natural 0.075ID x 0.03	1.0”	ML08003
6	Ftg, T, 1/16 ID hose	1	4102337	F	Hose, Natural 0.075ID x 0.03	3.0”	ML08003
7	Reducer, 1/16 x 1/8 ID hose	1	4102164	G	Hose, Clear 0.130 x 0.06W	1”	ML08007
8	Feedthru, 5/16-24 x 3/16 ID	1	4112018	H	Hose, Clear 0.130 x 0.06W	2.5”	ML08007
9	Restrictor, variable 1/4 barb	1	4107995	I	Hose, Clear 0.130 x 0.06W	12.5”	ML08007



GAP Water Trap, Solenoid, Variable Restrictor Replacement & Retubing

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4.24 CRT Assembly

The CRT assembly (monitor) is not field serviced, but is replaced as a complete assembly. Access to the monitor requires removing several panels on the machine. The mounting and connection arrangement is shown in Figure 4-24.

4.24.1 Turn the System Power switch to STANDBY. Remove AC power from the machine and pull all circuit breakers to their 'out' position.

4.24.2 Remove the upper left (facing the back of the machine) back panel from the machine.

4.24.3 At the front of the machine, remove the table lamp panel below the monitor.

4.24.4 If applicable, remove the two adjustment shaft extensions that project below the monitor shelf by pulling them straight off. (See illustration.)

WARNING: Do not touch any part of the CRT circuitry, as there could be a stored charge in high voltage portion of the circuit.

4.24.5 Disconnect the power, video and touch screen cables from the monitor.

4.24.6 Remove the four screws from the underside of the monitor shelf, and slide the monitor out the back of the machine.

4.24.7 Separate the in-line connector for the degaussing coil. Inspect the coil for damage; measure its resistance to chassis to ensure the coil is not shorted to the chassis. If necessary, replace the coil as follows:

4.24.8 Remove the six screws holding the front bezel assembly to the cabinet, and carefully remove the bezel.

4.24.9 Note the arrangement of the tie straps holding the bottom of the degaussing coil to the bezel - so that the replacement coil can be installed in the same manner. Cut and remove the tie straps.

4.24.10 Remove the screws holding the left and right coil brackets (mark these pieces so they can be reinstalled in the same manner), and remove the degaussing coil from the bezel.

.....

4.24.11 Install the replacement coil in the bezel with its arrows pointing forward, toward the front of the bezel.

Secure the coil with the left and right brackets at the top, and two new tie straps at the bottom.

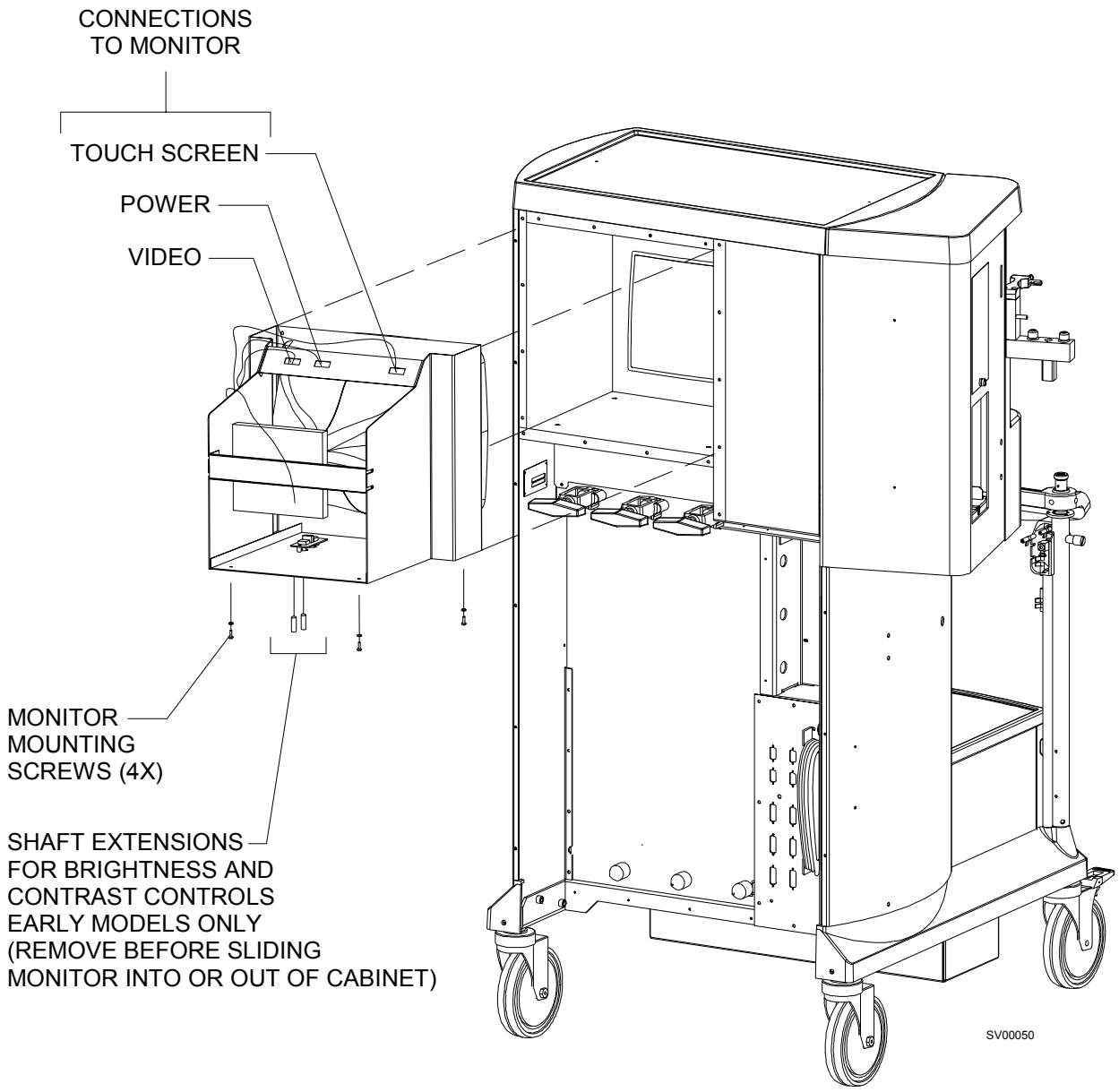
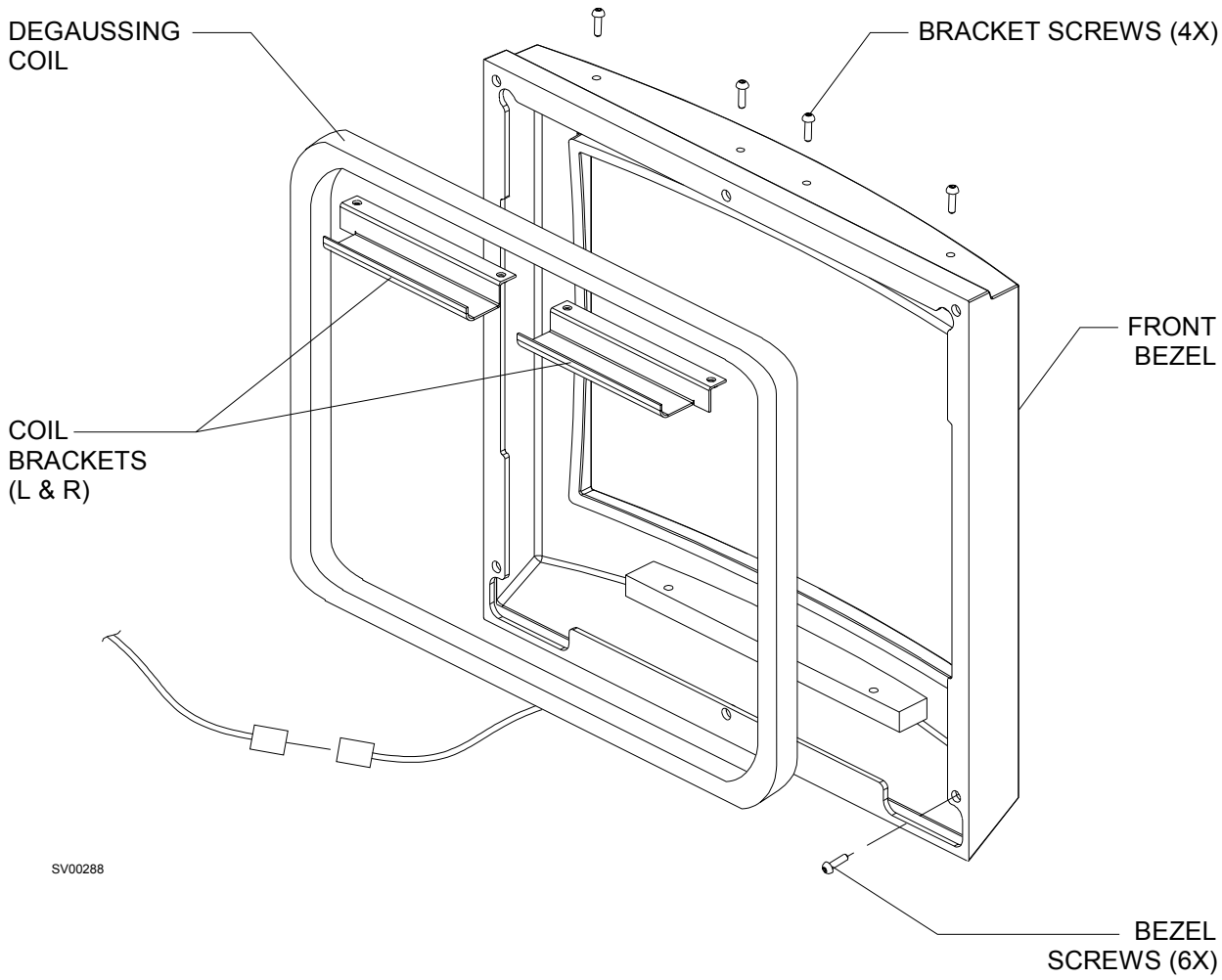

CONNECTIONS TO MONITOR
TOUCH SCREEN
POWER
VIDEO
MONITOR MOUNTING SCREWS (4X)
SHAFT EXTENSIONS FOR BRIGHTNESS AND CONTRAST CONTROLS EARLY MODELS ONLY (REMOVE BEFORE SLIDING MONITOR INTO OR OUT OF CABINET)
SV00050

Figure 4-24. CRT Assembly Replacement



Degaussing Coil Replacement

4.24.12 Reinstall the bezel assembly in the cabinet, and join the in-line connector for the degaussing coil.

4.24.13 Slide the replacement monitor in from the back of the machine (make sure there are no shaft extensions present), and reinstall the four screws that were previously removed.

4.24.14 Reconnect the power, video and touch screen cables to the monitor.

4.24.15 If applicable, reinstall the two shaft extensions by pressing them into place through the holes in the underside of the monitor shelf.

4.24.16 At the front of the machine, reinstall the table lamp panel below the monitor.

4.24.17 Enable the circuit breakers and restore AC power to the machine.

4.24.18 Turn the System Power switch to ON.

4.24.19 Following the power-up self test, exercise the touch screen and display functions to determine if CRT adjustments are needed. If adjustment is needed, refer to the procedure given in Section 5.

4.24.20 Perform the touch screen calibration procedure given in Section 5.

4.24.21 Reinstall the back panel of the machine.

4.24.22 Perform the PMC Procedure given in Section 6.

4.24A Flat Panel Display Assembly

The flat panel display includes two additional PCB assemblies and cables. Access to the display and related assemblies requires removal of several panels from the machine. Mounting and connection arrangements are shown in Figure 4-24A.

4.24A.1 Turn the System Power switch to STANDBY. Remove AC power from the machine and pull all circuit breakers to their 'out' position.

4.24A.2 Remove the upper left (facing the back of the machine) back panel from the machine.

4.24A.3 If you are replacing the PCB assembly supplied with the flat panel display, remove the table lamp panel at the front of the machine, and remove the PCB assembly. This PCB assembly is attached to the panel with screws. On machines that include a strip chart recorder on the panel, the PCB is attached by a snap-in arrangement.

4.24A.4 Disconnect the power, video, touch screen, and 9-cond. ribbon cables from the flat panel display.

4.24A.5 Remove the six screws holding the display assembly to the cabinet, and remove the assembly.

4.24A.6 Install the replacement display assembly in the cabinet with the hardware that was removed in the previous step.

4.24A.7 If applicable, install the replacement PCB assembly on the back of the table lamp panel. Route the 9-cond. ribbon cable up through the bottom of the cabinet in the same manner as the original.

4.24A.8 Reconnect the power, video, touch screen, and 9-cond. ribbon cables to the display assembly. Reinstall the back panel on the machine.

4.24A.9 Enable the circuit breakers and restore AC power to the machine.

4.24A.10 Turn the System Power switch to ON.

4.24A.11 Verify that the display is working.

4.24A.12 Perform the Flat Panel Display Brightness, Contrast and Phase adjustments given in Section 5.

4.24A.13 Perform the touch screen calibration procedure given in Section 5.

4.24A.14 Reinstall the table lamp panel.

4.24A.15 Perform the PMC Procedure given in Section 6.

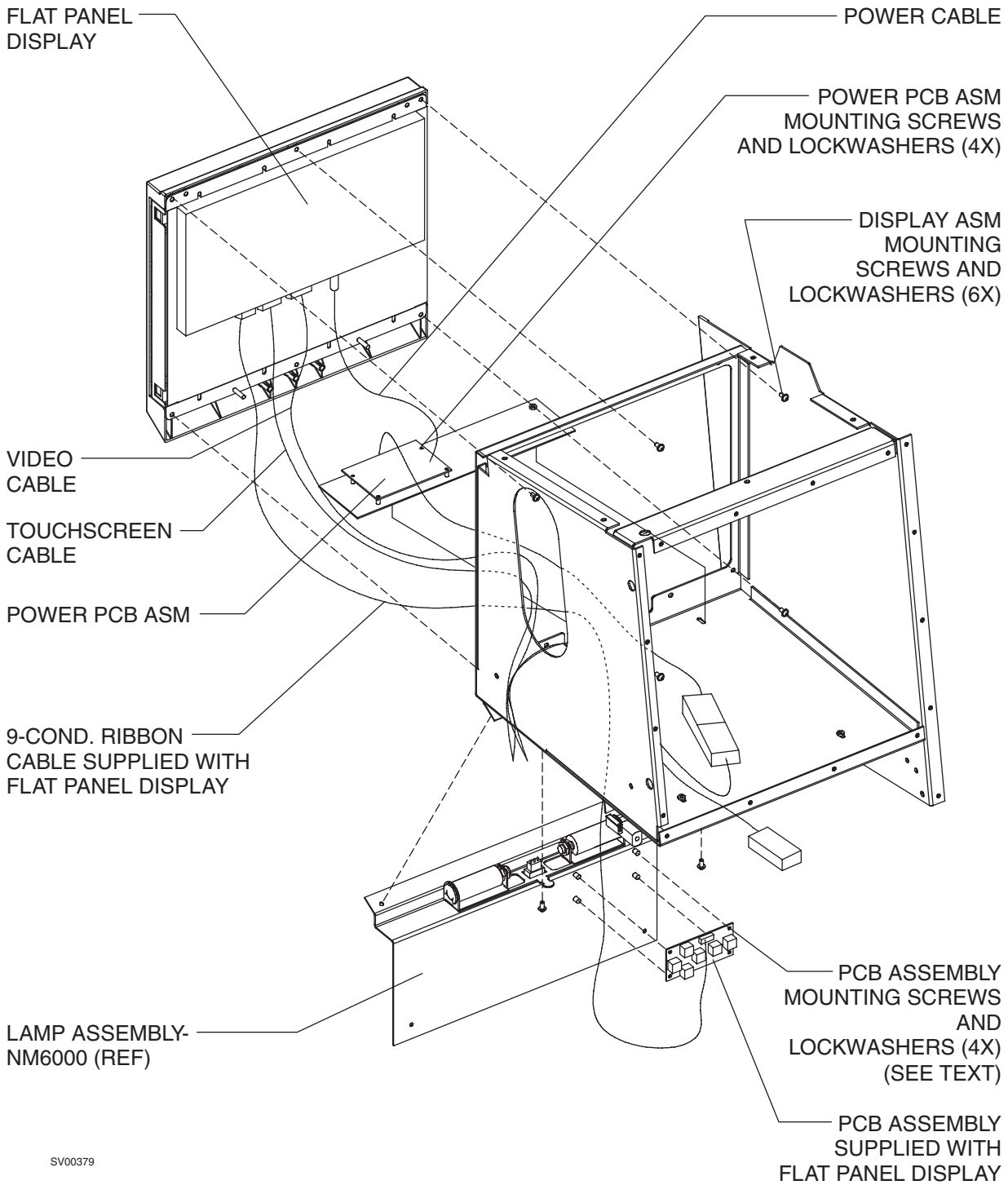

FLAT PANEL DISPLAY
POWER CABLE
POWER PCB ASM MOUNTING SCREWS AND LOCKWASHERS (4X)
DISPLAY ASM MOUNTING SCREWS AND LOCKWASHERS (6X)
VIDEO CABLE
TOUCHSCREEN CABLE
POWER PCB ASM
9-COND. RIBBON CABLE SUPPLIED WITH FLAT PANEL DISPLAY
LAMP ASSEMBLY- NM6000 (REF)
PCB ASSEMBLY MOUNTING SCREWS AND LOCKWASHERS (4X) (SEE TEXT)
PCB ASSEMBLY SUPPLIED WITH FLAT PANEL DISPLAY
SV00379

Figure 4-24A. Flat Panel Display Assembly

4.25 Table Lamp

The table lamp assembly includes the panel above the ventilator, two lamp assemblies, a rocker switch and wire harness as shown in Figure 4-25. Each lamp assembly contains a replaceable 12 V high intensity halogen bulb.

NOTE: If a strip chart recorder asembly is included on the panel, refer to Paragraph **4.25A** for details on the recorder mounting and connection arrangement.

4.25.1 Turn the System Power switch to STANDBY.

4.25.2 Remove the panel retainer screws and pull the assembly forward far enough to gain access to the in-line connector.

4.25.3 Carefully separate the in-line connector on the wire harness.

4.25.4 Loosen the jam nut on the assembly where the lamp is to be replaced, and remove the assembly from its bracket on the panel.

4.25.5 Gently pry up on the bulb cover lip while sliding it from the housing.

4.25.6 Remove the bulb by sliding it out of its socket.

CAUTION: The replacement bulb must be properly cleaned and handled or premature failure may result. Do not touch the glass envelope of the replacement bulb with your bare hands, as finger oil will damage the bulb. Use examination gloves to prevent soiling of the replacement bulb. Use isopropyl alcohol to clean the replacement bulb of oil residue.

4.25.7 Install the replacement bulb in the socket in the same manner as the original.

4.25.8 Reinstall the bulb cover on the lamp assembly, and reattach the assembly to the panel. Tighten the jam nut.

4.25.9 Join the in-line connector to the wire harness on the machine.

4.25.10 Reinstall the lamp panel and its trim piece with the hardware that was previously removed.

4.25.11 Turn the System Power switch to ON and verify that the lamp is working properly.

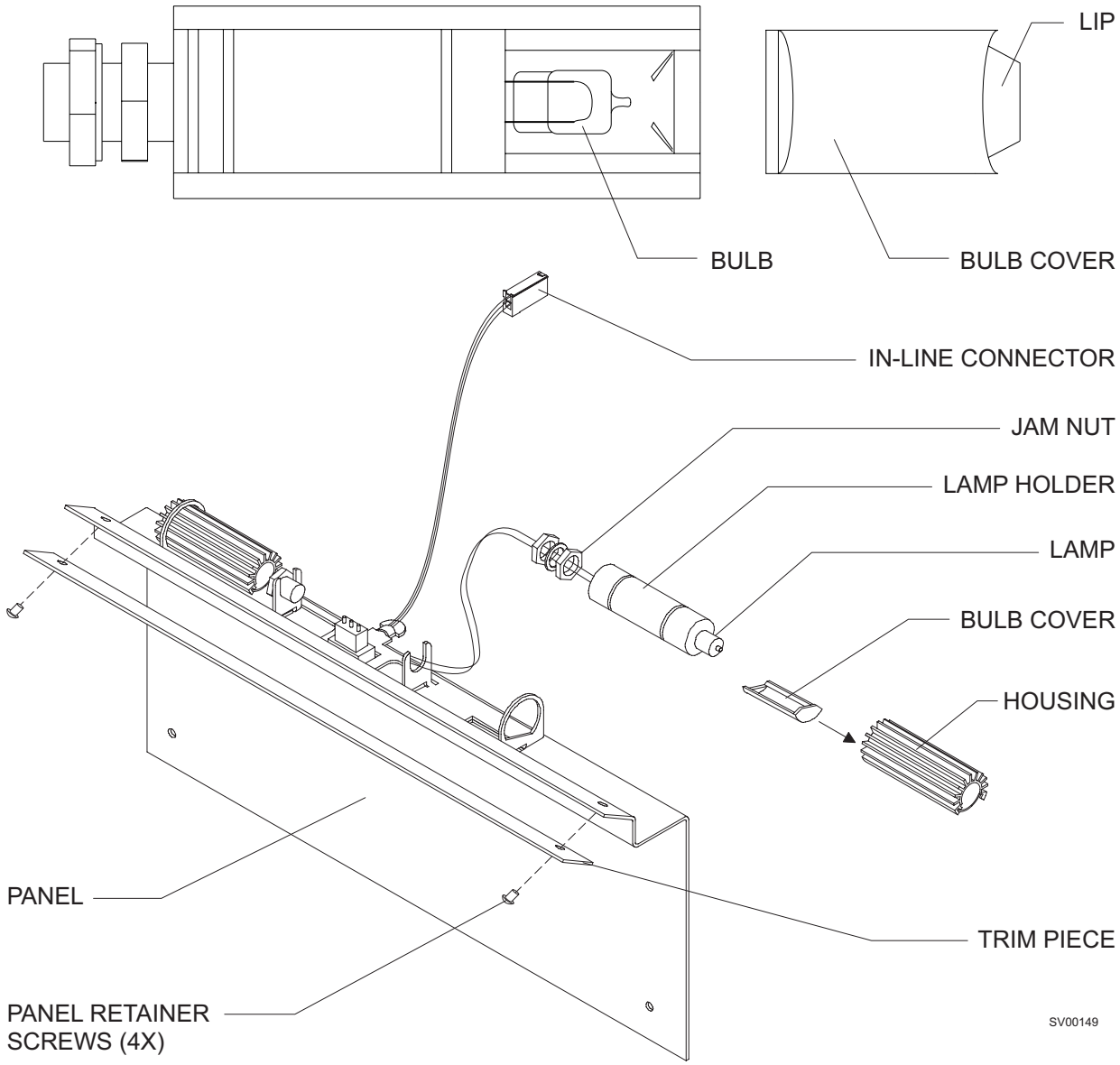


Figure 4-25. Lamp Assembly Replacement

4.25A Strip Chart Recorder Assembly

The optional strip chart recorder assembly is contained within the table lamp panel. This option is available only on machines with a flat-screen display. Except for lamp replacement (see Paragraph 4.25) and chart paper, the panel assembly is not serviced in the field but is replaced as a complete assembly when needed. Figure 4-25A shows the arrangement of the strip chart recorder assembly.

4.25A.1 Turn the System Power switch to STANDBY.

4.25A.2 Remove the panel retainer screws and pull the assembly forward far enough to gain access to the connectors.

4.25A.3 Carefully separate the in-line connector on the power wire harness.

4.25A.4 Open the clamp securing the Vitalbus cable to the strip chart chassis, then disconnect the Vitalbus cable.

4.25A.5 Carefully remove the display control PCB from the assembly (it mounts by a snap-in arrangement), and remove the recorder assembly from the machine.

4.25A.6 Install the the display control PCB on the replacement strip chart recorder assembly. Route the data cable out from the top of the SCR (cable trace connects to Pin 1).

4.25A.7 Route the power cable out from the top of the SCR and join the power connector to the assembly.

Secure the Vitalbus cable to the Vitalbus connector, and secure its retaining clamp.

4.25A.8 Reinstall the lamp panel and its trim piece with the hardware that was previously removed.

4.25A.9 Turn the System Power switch to ON and verify that the lamp is working properly.

4.25A.10 Ensure that the strip chart recorder is loaded with a paper roll.

4.25A.11 Perform the print test given in Section 2 and verify that the recorder is working properly.

4.25A.12 Access the Primary Service Screen. (Refer to Accessing the Service Screens in Section 2.1 of this manual.)

4.25A.13 Access the Advanced Service Mode. (refer to Accessing the Service Screens in Section 2.2 of this manual.) Select Service Config key, NM6K tab, select the SERVICE button and enter your Technicians ID#.

4.25A.14 Touch the Update tab in the NM6000 CONFIGURATION to access the UPDATE page. (Refer to Update Page in Section 2.4.2 of this manual.) Press the VPO and GAP Pod Base keys to initiate the POD Base download. Also press CV and SCR keys if these options are present. See Figure 4-25B.

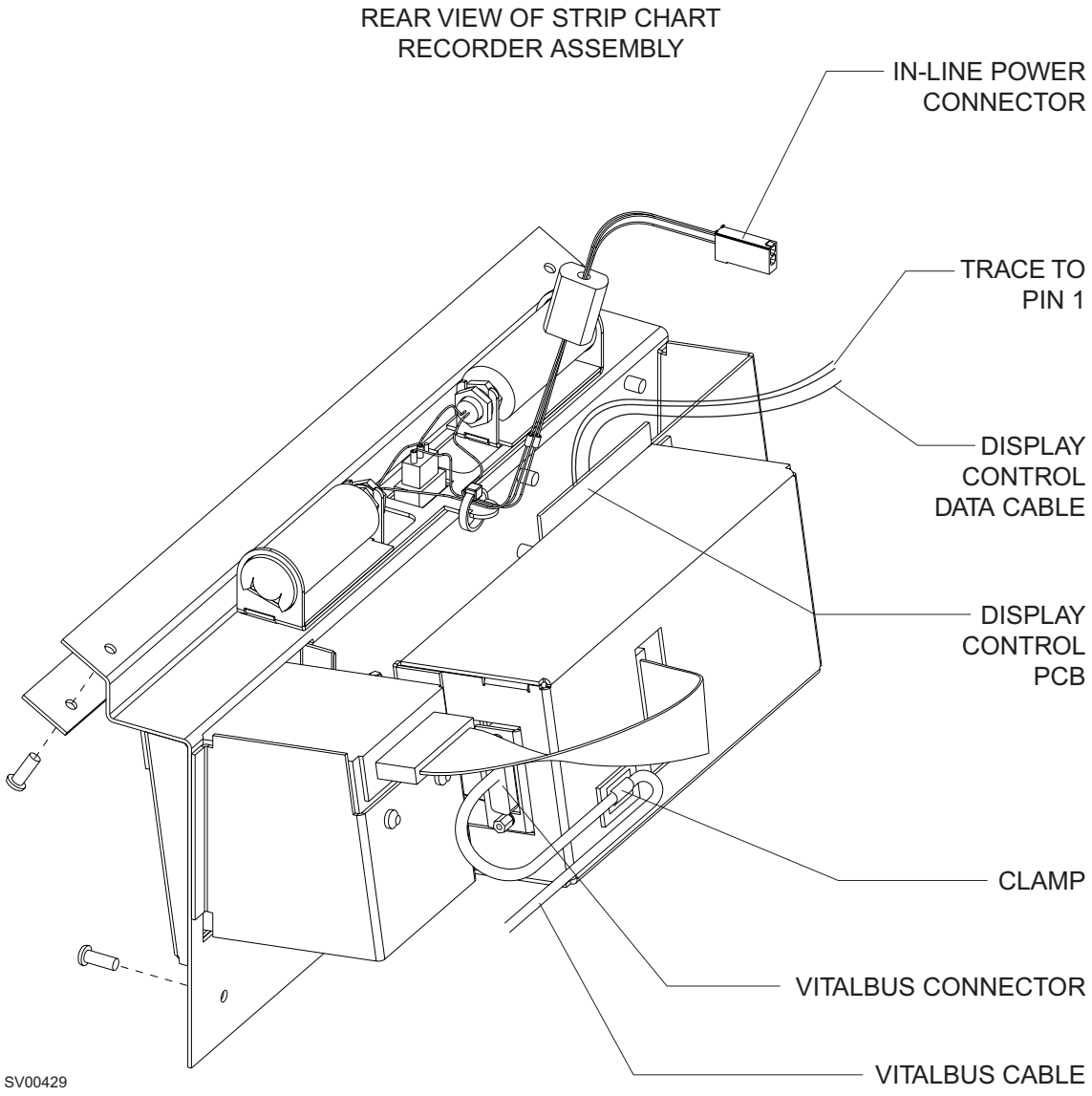


Figure 4-25A. Strip Chart Recorder Assembly

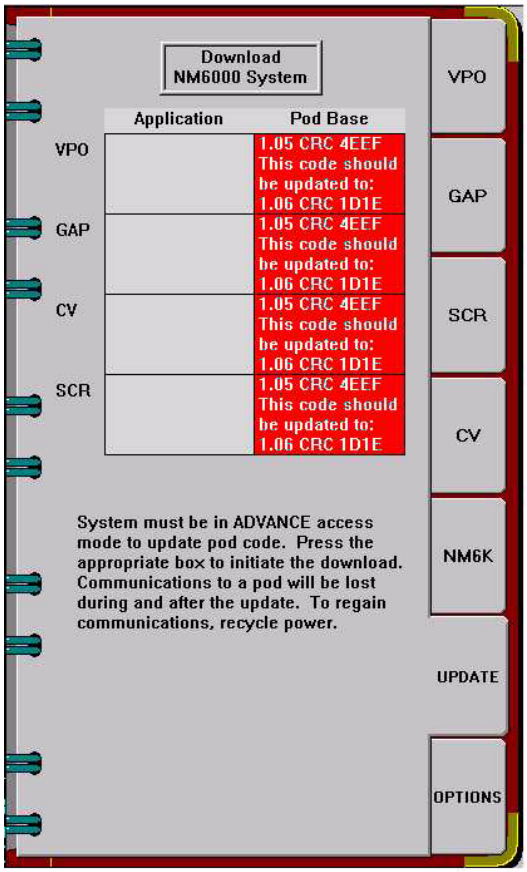


Figure 4-25B. NM6000 Service Config Notebook Update Page

NOTE: When the key is pressed, the notebook disappears. Press the service config key to refresh the service config notebook.

4.25A.15 After download is complete, exit from Service mode and cycle power.

4.25A.16 Verify all pods display Pod Based Software version 1.06 and CRC value 1D1E.

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4.26 Flow Sensor

The flow (respiratory volume) sensor is installed on an adapter at the expiratory valve on the breathing system. The arrangement is shown in Figure 4-26. along with its connection to the sensor interface panel on the machine.

NOTE: The electronics housing is not field servicable. If this component fails, the complete flow sensor assembly must be replaced.

4.26.1 Turn the System Power switch to STANDBY.

4.26.2 Disconnect the sensor plug from its receptacle on the sensor interface panel.

4.26.3 Disconnect the 22 mm breathing hose from the sensor.

4.26.4 Loosen the retaining ring on the adapter and remove the flow sensor.

4.26.5 Press down on the black lever under the flow housing and pull the flow housing and transducer assembly out of the electronic housing.

4.26.6 Pull both transducers out of the flow housing.

4.26.7 Rotate the replacement transducers while pressing them into their ports on the flow housing. Ensure that the three O-rings on each transducer are not damaged and re fully seated.

4.26.8 Slide the transducer/flow housing assembly into the electronic housing. Refer to the diagram on the housing to determine direction.

NOTE: A “click” should be audible when the lever secures the flow housing into the electronic housing. If the flow housing does not fit properly, make sure the pin on the electronic housing is properly aligned with the hole in the flow housing. If the pin is properly aligned, try shifting the flow housing from side to side until the transducers and housing fit properly in place.

4.26.9 Align the tab on the mounting adapter with the corresponding slot and attach the threaded port on the flow sensor to the goose neck adapter. Tighten the retaining ring (hand tighten only).

4.26.10 Plug the sensor cord into the volume connector on the sensor interface panel.

4.26.11 Reconnect the 22 mm breathing hose to the flow sensor.

4.26.12 Perform the power-up self test (6.18.3) and respiratory volume test (6.19) given in Section 6.

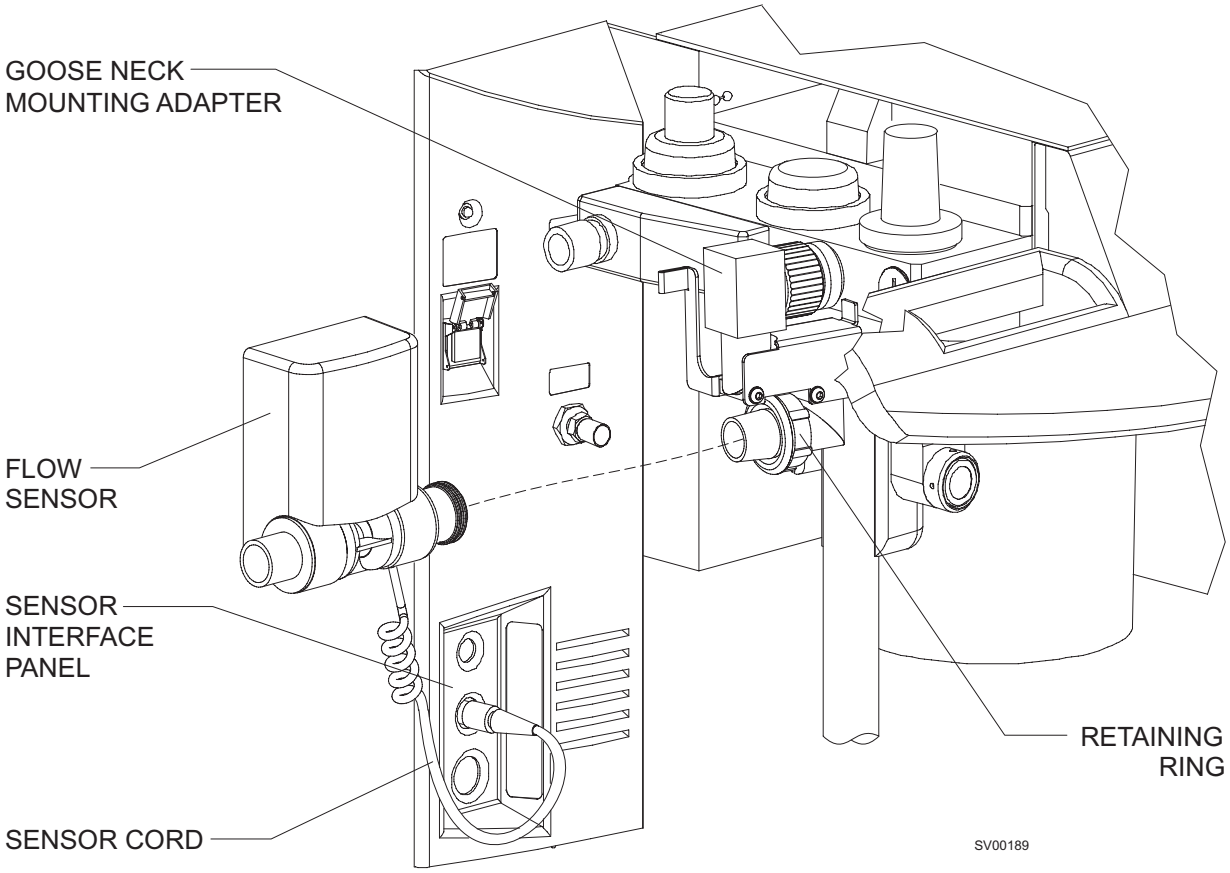

Figure 4-26. Flow Sensor

4.27 Oxygen Sensor

The oxygen sensor is plugged into the top of the inspiratory valve during machine operation. The arrangement of the sensor capsule and its housing, and also its connection to the sensor interface panel is shown in Figure 4-27.

4.27.1 Turn the System Power switch to STANDBY.

4.27.2 Pull the oxygen sensor housing from the inspiratory valve dome. (It is a press fit.)

4.27.3 Unscrew the cover from the sensor housing and remove the sensor capsule.

4.27.4 Remove the replacement sensor capsule from its shipping container and install it in the housing. Ensure that the copper rings on the capsule mate with the electrical contacts in the sensor housing.

4.27.5 Wait 15 minutes for the sensor capsule to stabilize.

4.27.6 Turn the System Power switch to ON and perform the 21% calibration procedure for the oxygen monitor given in Section 5.

NOTE: When the machine is not in use, the oxygen sensor is removed from the inspiratory valve dome, and the valve dome is plugged.

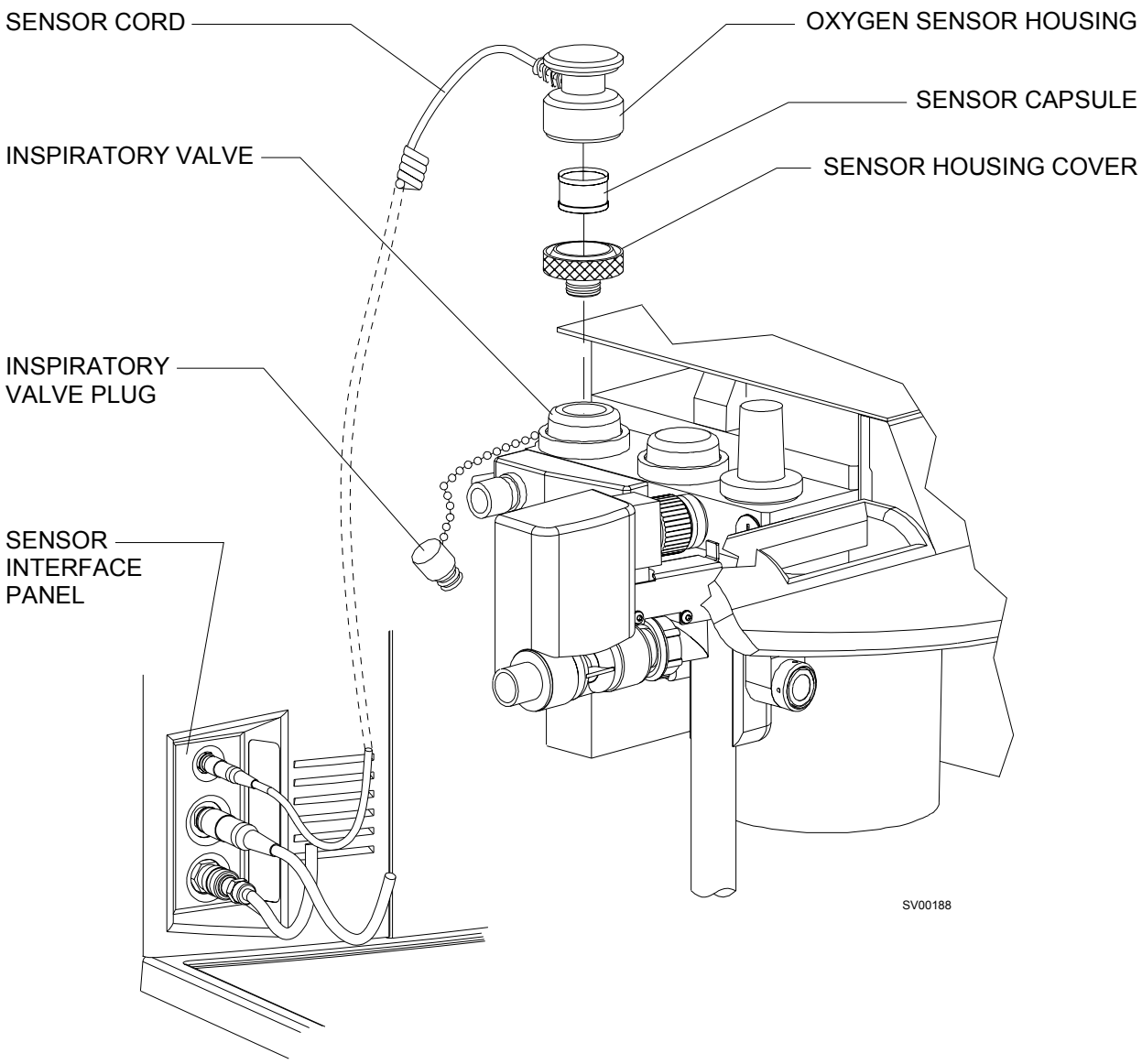

Figure 4-27. Oxygen Sensor Replacement

4.28 Lower Frame Cover (skirt) Replacement

4.28.1 Remove any unsecured equipment and accessories from the machine.

4.28.2 Remove the twelve cap screws securing the bottom of the skirt to the frame.

4.28.3 Remove the right side (facing the front of the machine) cover panel by removing the six screws at the back of the machine and the two at the front edge by the monitor display.

4.28.4 Remove the rear cover panel behind the pipeline inlets.

4.28.5 Disconnect the copper tube from the bottom of the suction pilot valve.

4.28.6 Remove the left side (facing the front of the machine) cover panel by removing the three screws at the back of the machine.

4.28.7 Remove the screws securing the skirt to the left and right standoffs near the rear casters.

4.28.8 Remove the drawer. Remove the two button head screws from the left and right front inside corners of the drawer housing.

4.28.9 Remove the two hex nuts at the rear of the drawer housing, and remove the housing.

4.28.10 Remove the three cap screws from the O_2 flush pole at the bulkhead connection.

4.28.11 Remove the button head screw at the bottom of the O_2 flush pole.

4.28.12 Loosen all screws securing the front blue shroud to the Divan ventilator and remove the two outer screws.

4.28.13 Swing the front shroud out and to the left.

4.28.14 Loosen the two button head screws securing the O_2 flush cover, and remove the cover.

4.28.15 Note the location of the tubing attached to the O_2 flush valve, and disconnect each hose.

4.28.16 Lift up the O_2 flush pole, and pull the tubing out of the pole.

4.28.17 Carefully pull the skirt forward; you will need to spread the sides of the skirt slightly apart in order to clear the machine as it is being removed from the machine.

4.28.18 Install the replacement skirt on the machine.

4.28.19 Slide the O_2 flush tubing into the flush pole, and reconnect the tube with two O2 labels to the lower valve fitting, and the tube with a single O2 label to the upper valve fitting (reinstallation should not require the use of a 'fish'). Reinstall the O_2 flush cover.

4.28.20 Place the O2 flush pole into the frame socket and secure it with the button head screw previously removed.

4.28.21 Reattach the front shroud to the Divan control panel.

4.28.22 Reinstall the three screws previously removed from the O_2 flush pole bulkhead.

4.28.23 Reinstall the drawer housing and secure the assembly with the hardware previously removed. Reinstall the drawer.

4.28.24 Reinstall the screws at the left and right side standoffs near the rear casters.

4.28.25 Install the left side lower cover panel using the hardware previously removed.

CAUTION: To prevent component damage, be careful when aligning the copper tube to the vacuum pilot valve.

4.28.26 Reconnect the copper tube to the bottom port of the vacuum pilot valve.

4.28.27 Reinstall the right side cover panel with the screws previously removed.

4.28.28 Reinstall the cover panel behind the pipeline inlets.

4.28.29 Reinstall the cap screws along the bottom of the skirt to the frame.

4.28.30 Reinstall any unsecured equipment and accessories that were previously removed from the machine.

4.28.31 Reconnect the oxygen pipeline hose.

4.28.32 Perform the PMC Procedure given in Section 6.

4.29 Divan Safety Plate Replacement

The safety plate is part of the piston coupling assembly and is located in the motor drive assembly. The Divan ventilator assembly must be removed from the machine for access to the piston coupling assembly. Following are the steps needed to replace the safety plate should it become damaged.

4.29.1 Remove the Divan ventilator assembly from the NM6000. Refer to Paragraph 4.16.

4.29.2 Remove the two screws securing the Divan cover weld assembly, and slide the cover back to remove it. See Figure 4-28.

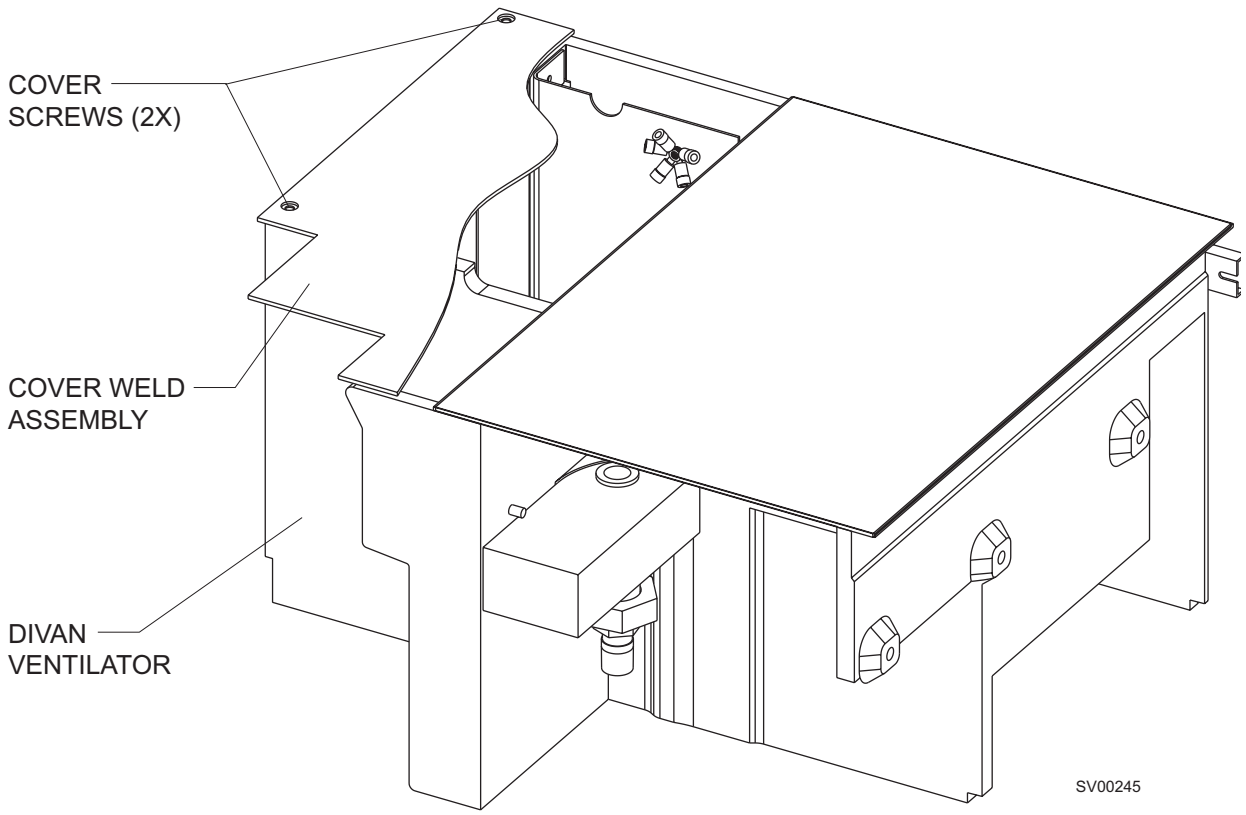

Figure 4-28. Divan Cover Removal

4.29.3 Manually move the piston coupling assembly back to obtain access to it.

4.29.4 Remove the two safety plate mounting screws, and remove the damaged safety plate. See Figure 4-29.

4.29.5 Install the replacement safety plate:

--Apply a small amount of Loctite #222 to the screw threads.

--Orient the safety plate as shown in the illustration, and as far forward as possible.

--Tighten the safety plate mounting screws securely.

4.29.6 Verify that there is clearance between the safety plate and the “U” shaped lever.

4.29.7 Ensure that the “U” shaped lever is in its up position and return the piston coupling assembly to its full forward position. Install and latch a piston-cylinder unit into the ventilator. Verify that the relieved area of the safety plate does not interfere with piston bolt as the drive belt shafts are rotated to move the piston coupling assembly back and forth.

4.29.8 Reinstall the Divan cover weld assembly.

4.29.9 Reinstall the Divan into the NM6000.

4.29.10 Perform the PMC Procedure given in Section 6.

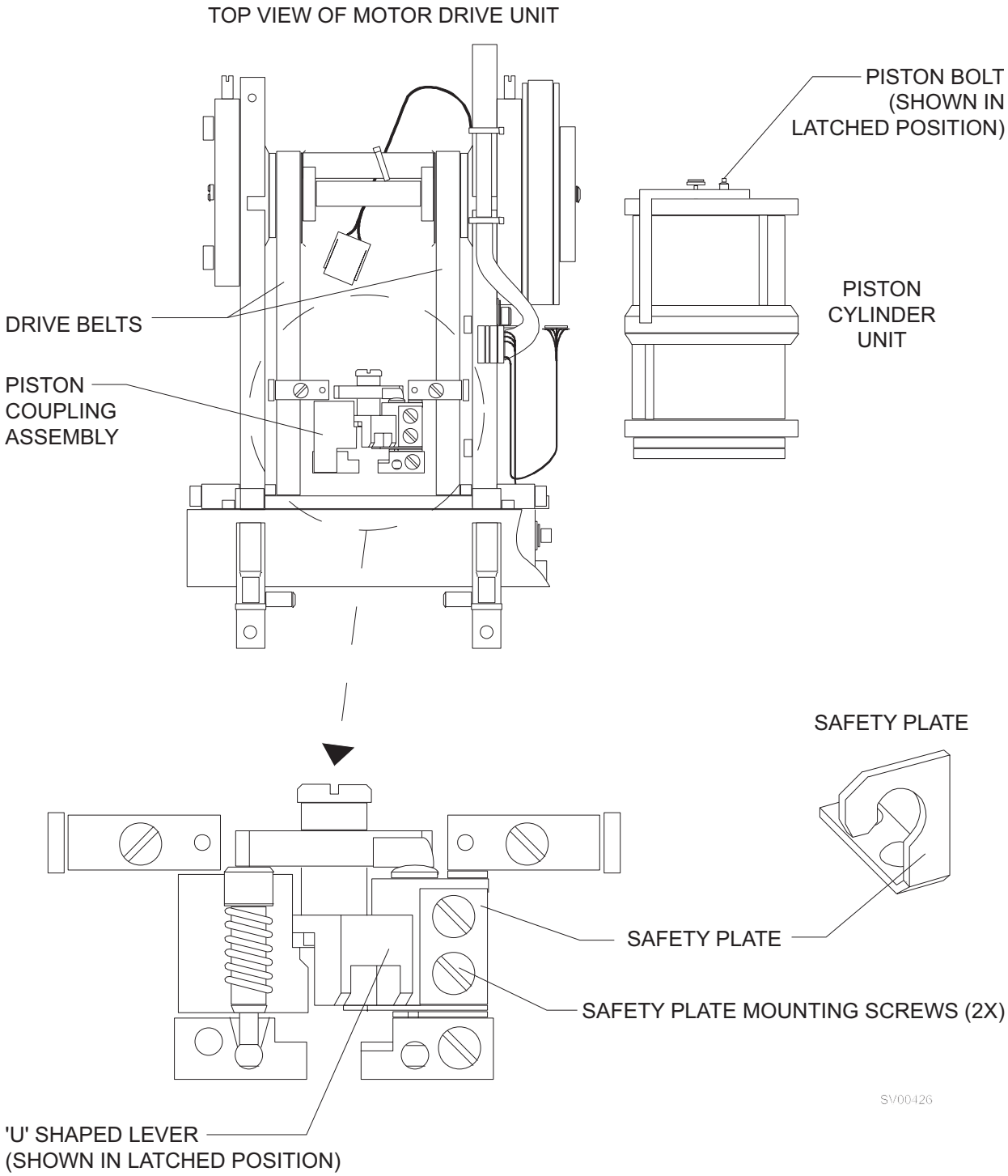

Figure 4-29. Safety Plate Replacement

4.30 WPU Mother Board Battery Replacement

The battery is internal to the processor assembly located in the lower part of the machine, below the ventilator. Access to the processor's battery requires removal of the lower left back panel, disconnecting the power supply cables, and removal of the processor cover. The battery orientation is shown in Figure 4-30.

4.30.1 Turn the System Power switch to STANDBY.

4.30.2 Remove AC power from the machine and pull all circuit breakers to the 'out' position.

WARNING: Before servicing, ensure that AC power is removed from the machine and all circuit breakers are disengaged (pulled out). Failure to observe this precaution may cause injury by electrical shock.

CAUTION: Before servicing, ensure that all circuit breakers are disengaged (pulled out). Failure to observe this precaution may cause damage to electrical components.

4.30.3 Close all cylinder valves and remove the cylinders from their yokes.

4.30.4 Remove the Vitalbus Hub mounting hardware (do not disassemble the hinge hardware). Remove the power cord strain relief retainer and swing open the assembly.

4.30.5 Remove the left back panel mounting hardware, and remove the panel from the machine.

4.30.6 Disconnect all cables from the power supply. Place a sheet of paper over the power supply cable connection opening to reduce the possibility of hardware falling into the power supply box.

4.30.7 Remove the screws securing the processor cover.

4.30.8 Locate the 3 volt lithium battery (P/N 4116144) on the processor mother board. Note its orientation (see illustration) and remove the battery.

4.30.9 Insert the battery and ensure that it is properly seated into its socket.

4.30.10 Reinstall the processor cover.

4.30.11 Remove the paper from the power supply and reattach all cables to their original locations.

4.30.12 Reinstall the back panel on the machine.

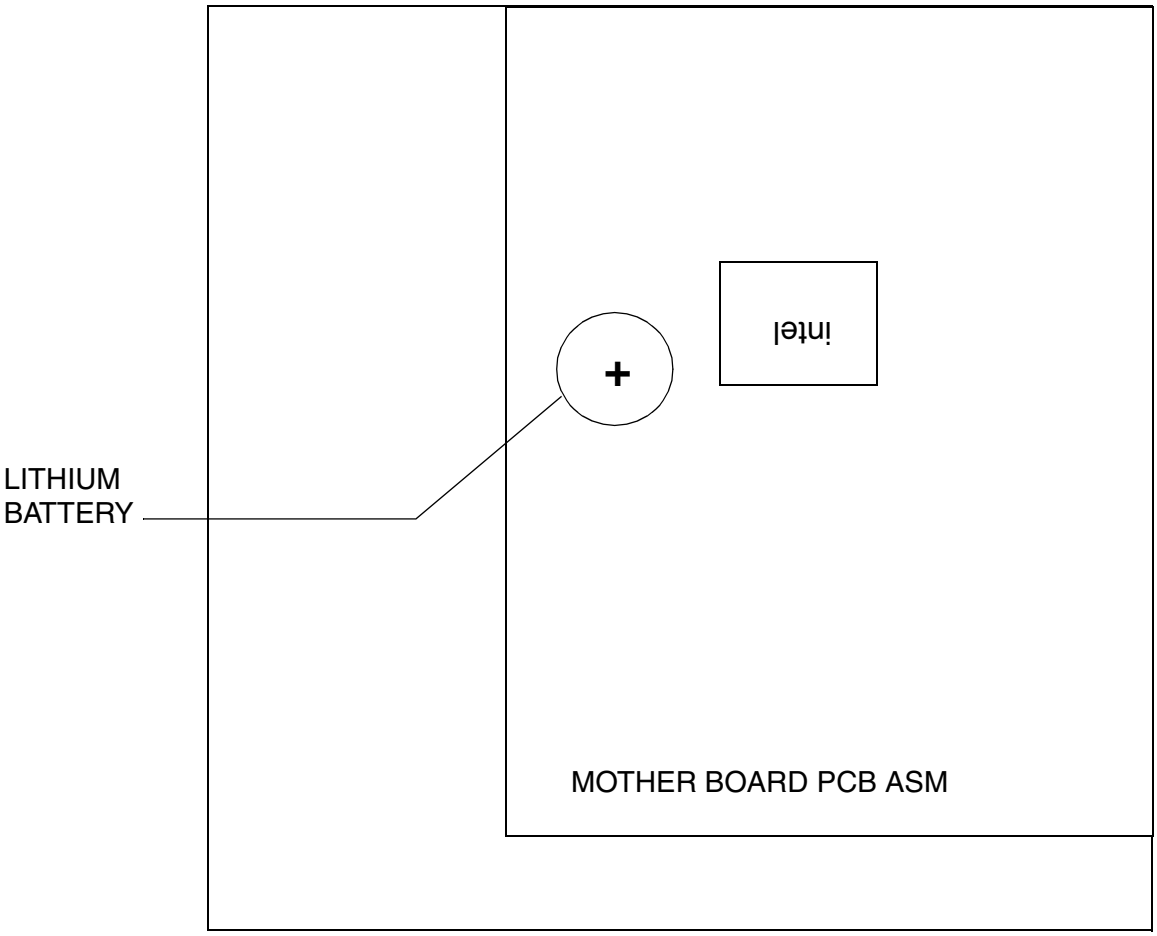

Figure 4-30. WPU Lithium Battery Location

4.30.13 Swing the Vitalbus Hub door closed. Reattach the power cord strain relief retainer and reinstall the previously removed hardware.

4.30.14 Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole dirrectly above the power cord socket as shown in Figure 4-30A.

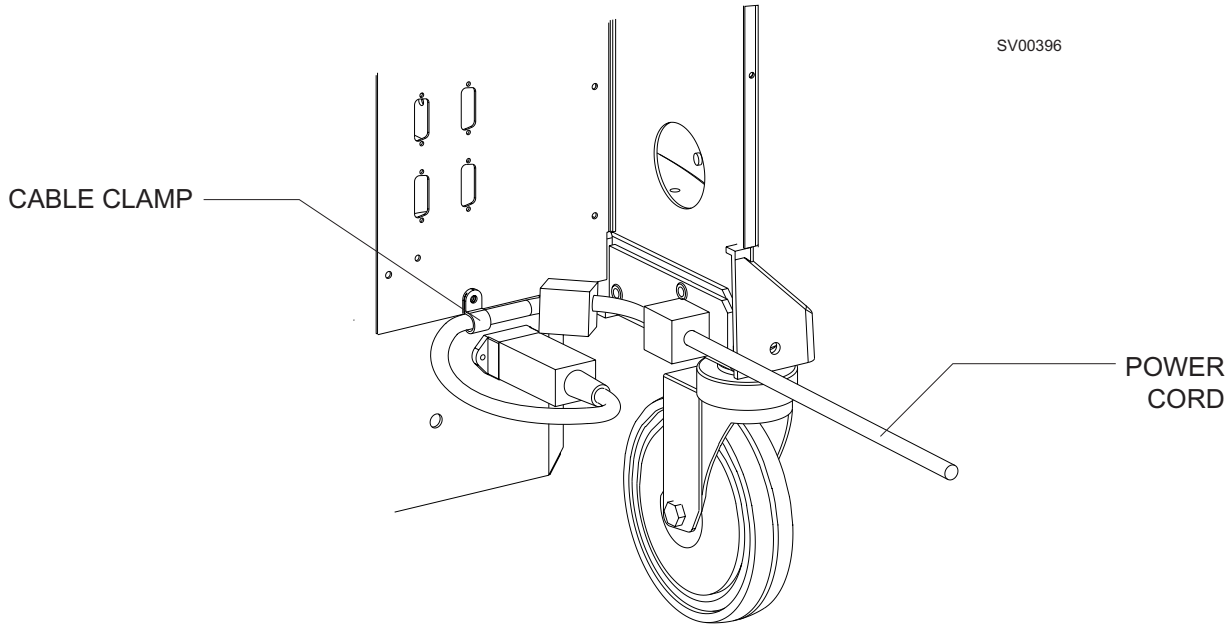

Figure 4-30A. Power Cord Routing

4.30.15 Attach the cylinders to the yokes.

4.30.16 Enable all circuit breakers and reconnect AC power to the machine.

166 and 233 MHz WPU Bios Testing:

NOTE: If you have a 700 MHz WPU, skip to Step 4.30.24.

4.30.17 With the System Power switch at STANDBY, connect a keyboard to the DIN connector on the underside of the NM6000 cockpit as shown in Figure 4-30B.

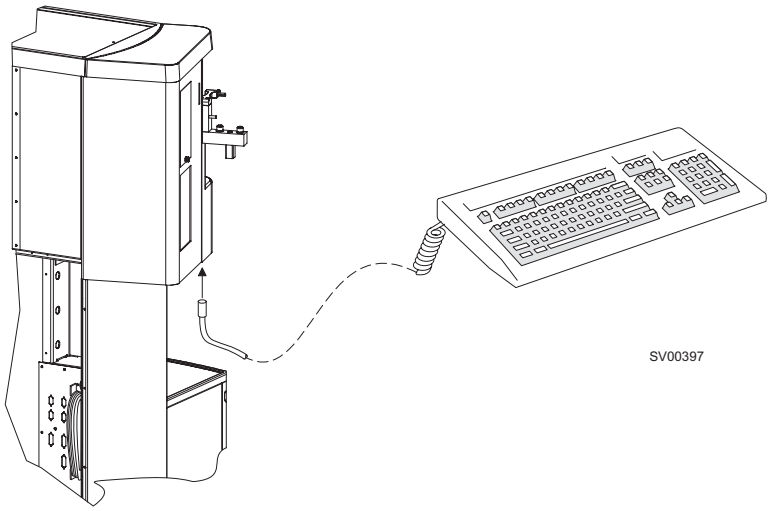

Figure 4-30B. Keyboard Connection

4.30.18 Press and hold F1 on the keyboard and turn the System Power switch to ON. Release the F1 key when the BIOS screen appears.

4.30.19 Using the arrow keys to navigate, select Load default BIOS settings, and press the Enter key to save.

4.30.20 Turn the System Power switch to STANDBY.

4.30.21 Press and hold F1 on the keyboard and turn the System Power switch to ON. Verify the following data, change settings as needed:

```
MAIN
   System Date:                  <current date>
   System Time:                  <current time>
   Floppy Options:               <press enter>
      Floppy A:                  Disabled
      Floppy B:                  Disabled
      Floppy Access:             Read/Write
                                                Press esc to return

   Primary IDE Master:           (various brands/types) <press enter>
      IDE Device Config.:        Auto Config.
      IDE Translation Mode:      Auto detected
      Multiple Sector Setting:   Auto detected
      Fast Programmed I/O        Auto detected
                                                Press esc to return
```

```
    Primary IDE Slave:              CD-ROM       <press enter>
       IDE Config:                  Auto Config
       IDE Translation Mode:        Auto detected
       Multiple Sector Setting:     Auto detected
       Fast Programmed I/O:         Auto detected
                                                 Press esc to return

    Secondary IDE Master:           Not installed <press enter>
       IDE Config:                  Disabled
       IDE Translation Mode:        Auto detected
       Multiple Sector Setting:     Auto detected
       Fast Programmed I/O:         Auto detected
                                                 Press esc to return

    Secondary IDE Slave:            Not installed <press enter>
       IDE Config:                  Disabled
       IDE Translation Mode:        Auto detected
       Multiple Sector Setting:     Auto detected
       Fast Programmed I/O:         Auto detected
                                                 Press esc to return

    Boot Options:                   <press enter>
       Second Boot Device:          Hard Disk
       Third Boot Device:           Disabled
       Fourth Boot Device:          Disabled
       System Cache:                Enabled
       Boot Speed                   Turbo
       Num Lock:                    Off
       Setup Prompt:                Enabled
       Hard Disk Pre-Delay:         Disabled
       Typematic Rate Programming   Default
                                      Press esc to return, arrow➜ to advance

ADVANCED
    Peripheral Configuration        <press enter>
       Pri. PCI IDE Int.:           Auto configured
       Sec. PCI IDE Int.:           Disabled
       Floppy Interface:            Auto configured
       Ser. Port1 Int.:             COM1 3f8 IRQ4
       Ser. Port2 Int.:             COM2 2f8 IRQ3
       Port 2 IR Mode:              Disabled
       Parallel Port Int.:          LPT1 378 IRQ7
       Parallel Port Type:          Compatible
       USB Interface                Disabled
                                                 Press esc to return

    Audio Configuration:            <press enter>
       Audio Config. Mode:          Manual
       SB Port Base:                220h
       WSS Port Base:               530h
       MPU Port Base:               330h
       WSS Int.:                    IRQ11
       SB/MPU:                      IRQ5
       WSS Play DMA:                Channel 0
       SB Play/WSS DMA:             Channel 1
```

```
   Game Port:                    Disabled
                                              Press esc to return
disregard (Game Port Status      Disabled)
disregard (FM Synthesizer Port Status 388)

Advanced Chipset Config:         <press enter>
   Base Memory:                  640KB
   ISA LFB Size:                 Disabled
   Video Pallet Snoop:           Disabled
   Latency Timer:                64
disregard (Bank 0 Fast Page DRAM)
disregard (Bank 1 Fast Page DRAM)
   Onboard Video IRQ             Disabled
                                              Press esc to return

Power Management Config.:        <press enter>
   Adv. Pwr. Mgmt.:              Enabled
   IDE Drv. Pwr. Dwn.:           Enabled
   VESA Video Pwr. Dwn.:         Disabled
   Inactivity Timer:             10
   Hot Key (ctrl-alt)            Z
                                              Press esc to return

Plug and Play Configuration:     <press enter>
   Config. Mode:                 Use BIOS Setup
   ISA Shared Memory Size:       Disabled
   IRQ9                          Used by ISA card
   IRQ10                         Available
   IRQ15                         Used by ISA card
                                              Press esc to return
```

NOTE: DO NOT enter SECURITY setting.

4.30.22 Select <F10> then Enter to save and exit the system BIOS.

4.30.23 Enter the Setup menu and verify that time and date settings are correct.

Enter The Service menu and verify that next PM due date is correct.

700 MHz WPU BIOS Testing:

4.30.24 With the System Power switch at STANDBY, connect a keyboard to the DIN connector on the underside of the NM6000 cockpit as shown in Figure 4-30B

4.30.25 Press and hold <DEL> on the keyboard and turn the System Power switch to ON. Release the <DEL> key when the BIOS screen appears.

Setup the system BIOS as follows:

```
Standard CMOS Setup
   System Date:                  <current date>
   System Time:                  <current time>
   Primary IDE Master:           Auto
   Primary IDE slave:            None
   Secondary IDE Master:         None
   Secondary IDE Slave:          None
   Drive A:                      None
   Drive B:                      None
   Video:                        EGA/VGA
   Halt On:                      All, But Keyboard

BIOS Features Setup
   Virus Warning:                Disabled
   CPU L1 Cache:                 Enabled
   CPU L2 Cache:                 Enabled
   CPU L2 Cache ECC Checking:    Enabled
   Quick Power on Self Test:     Disabled
   Boot Sequence:                C Only
   Swap Floppy Drive:            Disabled
   Boot Up Floppy Seek:          Disabled
   Boot Up Num Lock Status:      Off
   Typematic Rate Setting:       Disabled
   Typematic Rate (Char/Sec):    6
   Typematic Delay (mSec):       250
   Security Option:              Setup
   PCI/VGA Palette Snoop:        Disabled
   OS Select of DRAM>64 Mbytes:  Non-OS2
   HDD S.M.A.R.T. Capability:    Enabled
   Processor Serial Number       Disabled

Chip Set Features Setup
   SDRAM RAS to CAS Delay:       3
   SDRAM RAS to CAS Delay:       3
   SDRAM RAS to CAS Delay:       3
   SDRAM Pre-charge Control:     Disabled
   DRAM Data Integrity Mode:     ECC
   System BIOS Cacheable:        Enabled
   Video BIOS Shadow:            Disabled
   Video RAM Cacheable:          Disabled
   8 Bit I/O Recovery Time:      3
   16 Bit I/O Recovery Time:     2
   Memory Hole at 15M to 16M:    Disabled
   PCI 2.1 Compliance:           Enabled
   AGP Grapics Aperture          64 MB
```

```
    CPU/PCI Clock (MHz):            Default
    Spread Spectrum:                Disabled

Power Management Setup
    ACPI Function                   Disabled
    Power Management:               Disabled
    PM Controlled by APM:           No
    Video Off Method:               DPMS
    Video Off After:                Suspend
    Modem Use IRQ:                  NA
    Standby Mode:                   Disabled
    Suspend Mode:                   Disabled
    HDD Power down:                 Diaabled
    VGA Active Monitor:             Disabled
    Soft-Off by PWR-BTTN:           Instant-Off
    PWR Lost Resume State:          Turn On
    Resume on Ring:                 Disabled
    Resume on LAN:                  Disabled
    Resume on Alarm:                Disabled

PCI/Plug and Play Setup
    Resuorces Controlled By:        Manual
    Reset Configuration Data:       Disabled
    IRQ-3 Assigned to:              Legacy ISA
    IRQ-4 Assigned to:              Legacy ISA
    IRQ-5 Assigned to:              PCI/ISA PnP
    IRQ-7 Assigned to:              Legacy ISA
    IRQ-9 Assigned to:              Legacy ISA
    IRQ-10 Assigned to:             PCI/ISA PnP
    IRQ-11 Assigned to:             Legacy ISA
    IRQ-12 Assigned to:             PCI/ISA PnP
    IRQ-14 Assigned to:             PCI/ISA PnP
    IRQ-15 Assigned to:             PCI/ISA PnP
    DMA-0 Assigned to:              PCI/ISA PnP
    DMA-1 Assigned to:              PCI/ISA PnP
    DMA-3 Assigned to:              PCI/ISA PnP
    DMA-5 Assigned to:              PCI/ISA PnP
    DMA-6 Assigned to:              PCI/ISA PnP
    DMA-7 Assigned to:              PCI/ISA PnP
    Assign IRQ for VGA:             No
    Assign IRQ to USB:              No
    PCI Slot 1 Use IRQ:             Auto
    PCI Slot 2 Use IRQ:             5
    PCI Slot 3 Use IRQ:             Auto
    PCI Slot 4 Use IRQ:             10
    Used MEM Base Address:          N/A

Integrated Peripherals
    IDE HDD Block Mode:             Enabled
    IDE Primary Master PIO:         Auto
    IDE Primary Slave:              Auto
    IDE Primary Master UDMA:        Auto
    IDE Primary Slave UDMA:         Auto
    IDE Secondary Master UDMA       Auto
    IDE Secondary Slave UDMA:       Auto
    On-Chip Primary PCI IDE:        Enabled
    On-Chip Secnodary PCI IDE:      Disabled
    USB Keyboard Support:           Disabled
```

```
Init Display on First:          PCI
KBC Input Clock:                8 MHz
Onboard FDC Controller:         Enabled
Onboard Serial Port1:           3F8/IRQ4
Onboard Serial Port1:           2F8/IRQ3
UART 2 Mode:                    Normal
Onboard Parallel Port:          378/IRQ7
Parallel Port Mode:             SPP
Keyboard/Mouse Power On:        Disabled
```

4.30.26 Select <F10> to save and exit the system BIOS.

4.30.27 Select <Enter> to reboot the system.

4.30.28 Select <Enter> when prompted for the date and time.

4.30.29 Disconnect the keyboard.

4.30.30 Enter the Setup menu and verify that time and date settings are correct.

4.30.31 Enter the Service menu and verify that next PM due date is correct.

4.31 Vaporizer Mounting and Exclusion System

Figure 4-31 shows the tubing and connection arrangement at the back of the vaporizer mounting and exclusion system manifold.

4.31.1 Turn the System Power switch to STANDBY. Disconnect the AC power cord and disable the circuit breakers.

4.31.2 Remove all vaporizers from the mounting and exclusion assembly.

4.31.3 On the left (facing the front of the machine) side of the cockpit area, remove the upper blind plate or Integrated Patient Monitoring Module if applicable.

4.31.4 Disconnect the two copper tubes at the back of the vaporizer mounting and exclusion system manifold.

4.31.5 Remove the two brass fittings from the assembly and discard the existing copper washer. Clean the residual Loctite from the threads of the fittings.

4.31.6 While supporting the vaporizer and exclusion assembly at the front, remove the large jam nuts and lockwashers and slide the assembly forward to remove it from the machine.

4.31.7 Install the replacement assembly using the hardware previously removed. Before tightening the hardware make certain the assembly is level and flush with the cockpit panel.

4.31.8 Apply a minimal amount of Loctite #222 (purple) to the pipe threads of the larger fitting and install it into the vaporizer mounting and exclusion system port at the inboard location.

4.31.9 Slip a new copper washer (P/N 4110792-093) onto the other brass fitting and install it into the outside vaporizer mounting and exclusion system port.

4.31.10 Reconnect the two copper tubes to the brass fittings.

4.31.11 Lubricate the vaporizer mounting and exclusion system slider bar with Molykote P/N 4115127.

4.31.12 Reinstall and secure the blind plate, or reinstall the Integrated Patient Monitoring Module if applicable.

4.31.13 Reinstall all vaporizers that were previously removed. If the machine has a D-Tec Desflurane vaporizer, refer to SP00189. Refer to the Setup and Installation manual for all other model vaporizers.

4.31.14 Reconnect the AC power cord and enable the circuit breakers.

4.31.15 Perform a Fresh Gas Leak test and Vaporizer Exclusion and alignment checks. Refer to Section 7.1 for modifications and adjustments.

4.31.16 Perform a PMC on the Integrated Patient Monitoring Module if applicable.

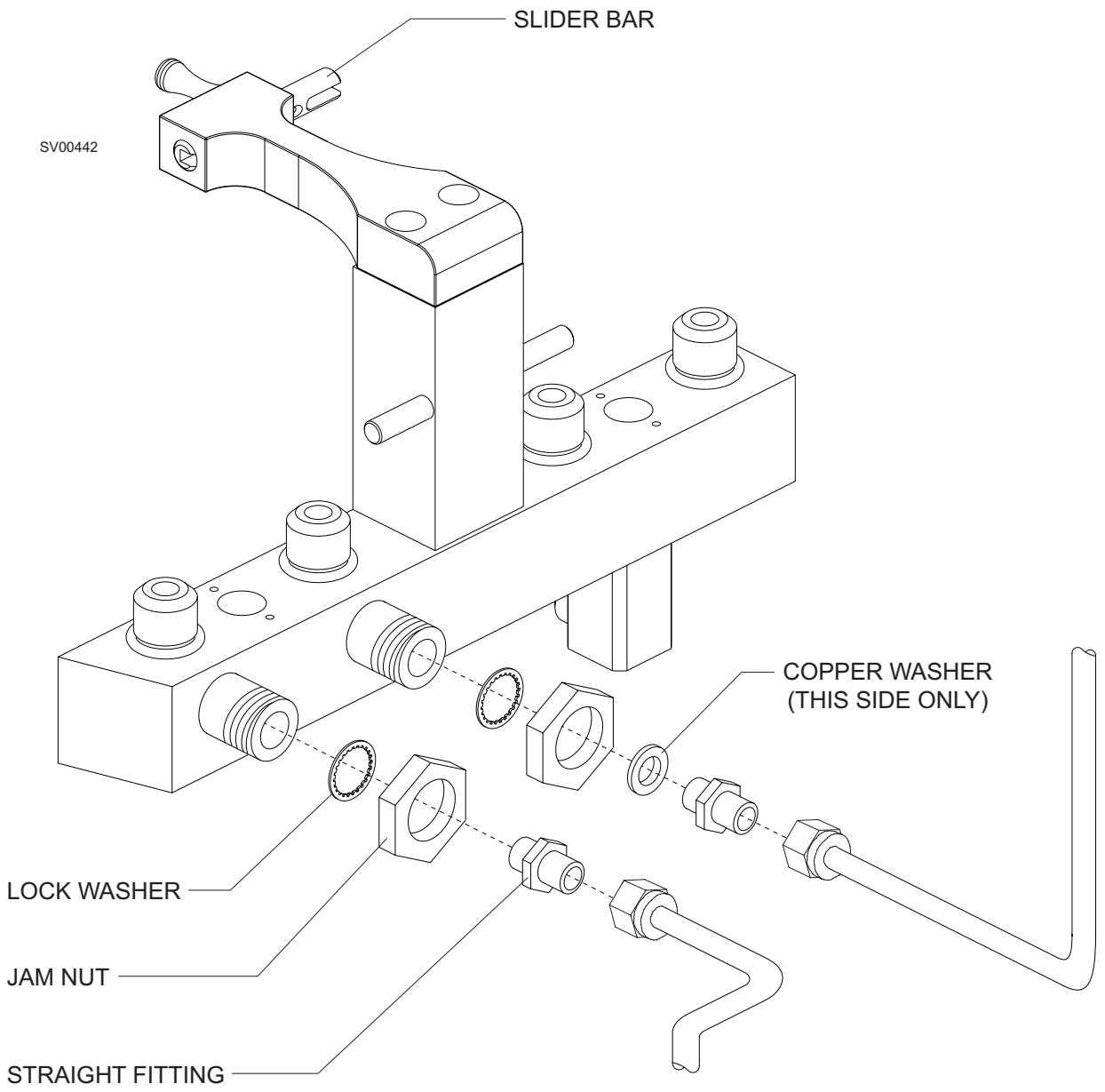

Figure 4-31. Vaporizer Mounting and Exclusion System Assembly

4.32 Main Pneumatic Valve Replacement Procedure

The main pneumatic valve is threaded into the system power switch housing, Access to this assembly and its tubing connections requires removal of the bottom plate below thw System Power switch.

4.32.1 Disconnect the oxygen pipeline hose.

4.32.2 Close the oxygen cylinder valve and press the O2 Flush to depressurize the oxygen circuit.

4.32.3 Turn the System Power switch to STANDBY and remove AC power from the machine.

4.32.4 Pull the circuit breakers to their 'out' position.

4.32.5 Remove the cockpit bottom plate.

4.32.6 Locate the main pneumatic switch. Using a wrench at the base of the compression fittings to support the valve, disconnect the copper tube ferrules.

4.32.7 Remove the valve assembly from the housing by rotating it counter-clockwise.

4.32.8 Apply Loctite #271 (red) to the threads of brass fitting P/N 4109408 and P/N 4109410, and install them into replacement valve P/N 4103588 in the same orientation as the original.

CAUTION: When assembling the elbow fitting so not apply torque to the valve body and the fittings; you must torque between the hex nut and the fitting to prevent damage to the valve.

4.32.9 Thread the locking nut onto the valve body but do not tighten it.

4.32.10 Thread the replacement valve into the housing but do not tighten it.

4.32.11 Attempt to turn the main switch to the ON position, then rotate the valve counter-clockwise one revolution until the switch can be turned to the ON position without binding at the top of the cam lobe.

4.32.12 Align the assembly's valve ports to the copper tubes. Do not rotate the assembly clockwise or more than one revolution.

4.32.13 Using a rocking motion, secure the assembly to the housing with the locknut. With a wrench at the base of the compression fittings to suppoort the valve, reconnect the copper tube ferrules.

4.32.14 Restore AC power to the machine and reset the circuit breakers.

4.32.15 Reconnect the oxygen pipeline hose.

4.32.16 Perform an oxygen pipeline leak test.

4.32.17 Turn the System Power switch to ON, and verify the switch does not bind. Allow the machine to complete its self-diagnostic tests.

4.32.18 Set the ventilator to Volume mode ventilation, adjust the oxygen fresh gas flow to 10 L/min. Press the Oxygen Flush and verify the O2 SUPPLY LOW alarm does not activate.

4.32.19 Close all flow control valves and set the ventilator to Standby. Turn the System Power switch to STANDBY and verify the system electronics turn off.

4.32.20 Reinstall the cockpit bottom plate.

4.32.21 Perform the PMC procedure given in Section 6.

4.33 Divan Ventilator Front Bezel and Related Components Replacement

This procedure includes instructions for the replacement and testing of the following Narkomed 6000 Divan front bezel components:

--Divan Front Bezel Assembly P/N AF00468 and SEAF00468

--Divan Front Bezel Encoder P/N 8200957

--Divan Front Bezel Display PCB P/N 8202101

--Divan Front Panel LED & Bargraph P/N 8201090 and Alphanumeric display P/N 1827456

Divan Front Bezel Assembly Replacement Procedure:

4.33.1 Turn the System Power switch to STANDBY.

4.33.2 Disconnect AC Power from the machine and pull all circuit breakers to their 'out' position.

CAUTION: Use ESD precautions when handling any of the Divan electronics assemblies. These boards contain static sensitive components

4.33.3 Remove the front bumper from the ventilator chassis by removing the five screws on the underside of the front bumper; one screw at the right side rail; three screws securing the left side of the bumper to the bag pole, in order to swing the bumper away from the ventilator. See Figure 4-32.

4.33.4 Remove the three screws holding the front bar (these screws also retain the front display bezel of the ventilator). Set the bar aside and carefully pull the front display bezel downward; carefully disconnect its ribbon cable from the motherboard.

4.33.5 Record the removed panel S/N located at the lower right corner of the bezel PCB.

4.33.6 Record the S/N of the replacement panel. Set the display bezel in place and reconnect its data cable to the motherboard. While holding the bezel in place, reattach the front bar with the three screws that were previously removed.

4.33.7 Reinstall the front bumper.

4.33.8 Restore AC power and enable the circuit breakers.

4.33.9 Turn the System Power switch to ON and verify all front panel Leds illuminate, then verify the ventilator successfully completes its self-test routine.

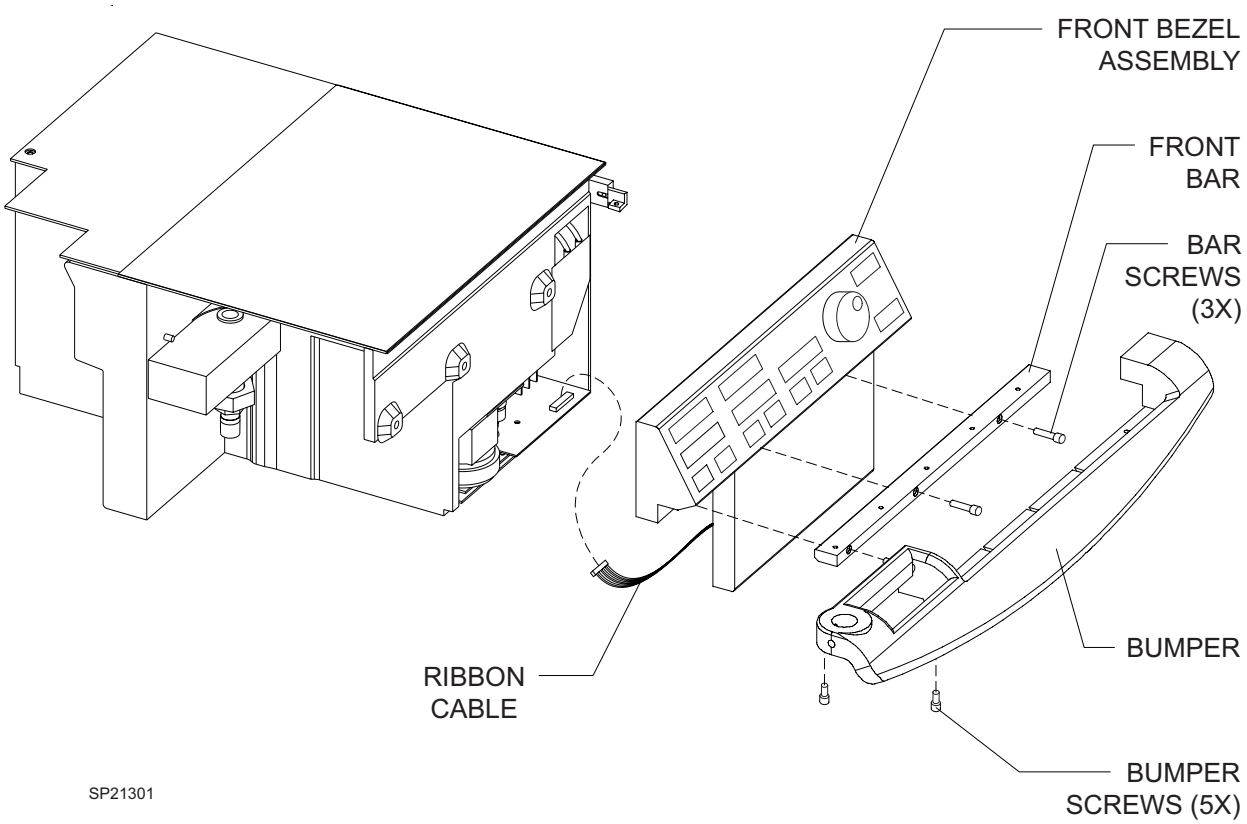

Figure 4-32. Divan Front Bezel Assembly

Divan Front Bezel Encoder Replacement Procedure:

4.33.10 Turn the System Power switch to STANDBY.

4.33.11 Disconnect AC Power from the machine and pull all circuit breakers to their 'out' position.

CAUTION: Use ESD precautions when handling any of the Divan electronics assemblies. These boards contain static sensitive components

4.33.12 Remove the front bumper from the ventilator chassis by removing the five screws on the underside of the front bumper; one screw at the right side rail; three screws securing the left side of the bumper to the bag pole, in order to swing the bumper away from the ventilator. See Figure 4-32.

4.33.13 Remove the three screws holding the front bar (these screws also retain the front display bezel of the ventilator). Set the bar aside and carefully pull the front display bezel downward; carefully disconnect its ribbon cable from the motherboard.

4.33.14 Pull the encoder knob off the shaft and remove the retaining nut securing the encoder assembly to the panel. Record its two-digit engraved date code. See Figure 4-33.

4.33.15 Carefully disconnect the translucent data cables and encoder wire harness from the PCB.

4.33.16 Remove the eight screws around the PCB perimeter securing it to the panel chassis.

4.33.17 Record the two-digit date code (see Figure 4-33) on the replacement encoder. Apply a small amount of purple Loctite (222) to the threads of the encoder. Align the notch on the encoder to the socket on the panel and reinstall the panel nut. Reattach the encoder knob.

CAUTION: Do Not allow Loctite to migrate into the encoder's moving parts.

4.33.18 Reconnect the data cables to the PCB. Connect the encoder wire harness to the PCB. The green wire on the five-pin connector attaches to Pin 1 on the PCB as identified by a white marking. The blue wire on the two-pin connector attaches to Pin one on the PCB as identified by a white marking. See Figure 4-34.

CAUTION: These wire harnesses are not keyed. Be certain they are attached in the proper orientation as noted in the above step.

4.33.19 Reinstall the eight screws to secure the PCB to the panel chassis. Apply a small amount of Red Insulating Varnish between the screws and the PCB.

CAUTION: Do Not over-torque the mounting screws.

4.33.20 Set the display bezel in place and reconnect its data cable to the motherboard. While holding the bezel in place, reattach the front bar with the three screws that were previously removed.

4.33.21 Reinstall the front bumper.

4.33.22 Restore AC power and enable the circuit breakers.

4.33.23 Turn the System Power switch to ON and verify the ventilator successfully completes its self-test routine. Verify the encoder increments and confirms selections properly.

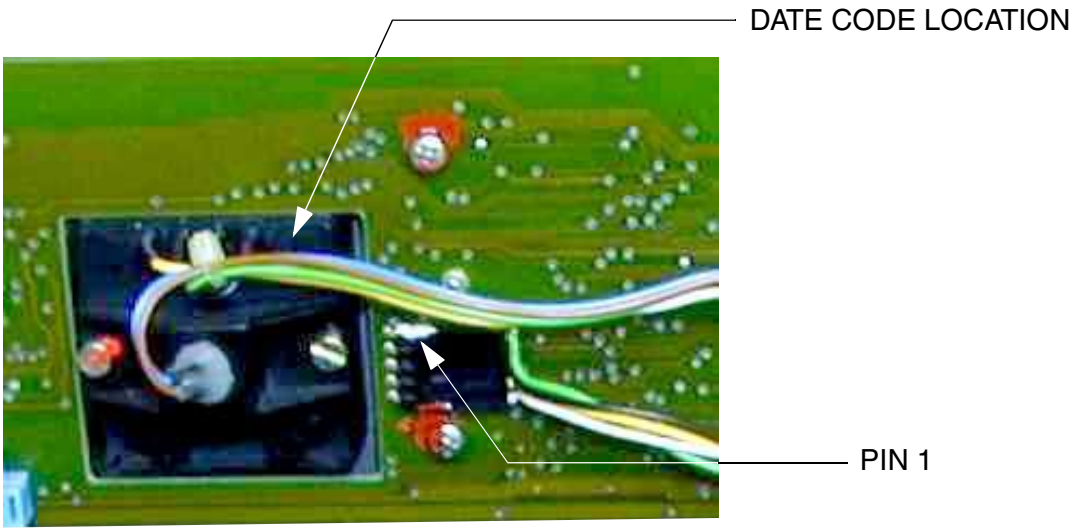

Figure 4-33. Encoder Date Code and Pin 1 Locations

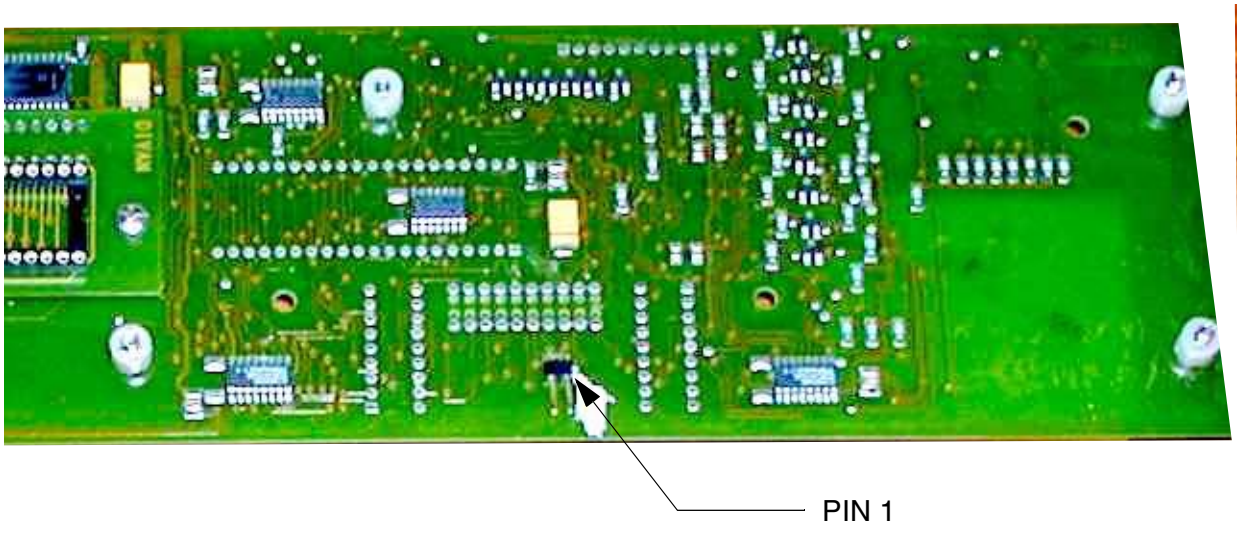

Figure 4-34. Divan Front Panel PCB - Pin 1 Location

Divan Front Bezel Display PCB Replacement Procedure:

4.33.24 Turn the System Power switch to STANDBY.

4.33.25 Disconnect AC Power from the machine and pull all circuit breakers to their 'out' position.

CAUTION: Use ESD precautions when handling any of the Divan electronics assemblies. These boards contain static sensitive components

4.33.26 Remove the front bumper from the ventilator chassis by removing the five screws on the underside of the front bumper; one screw at the right side rail; three screws securing the left side of the bumper to the bag pole, in order to swing the bumper away from the ventilator. See Figure 4-32.

4.33.27 Remove the three screws holding the front bar (these screws also retain the front display bezel of the ventilator). Set the bar aside and carefully pull the front display bezel downward; carefully disconnect its ribbon cable from the motherboard.

4.33.28 Record the serial number located at the lower right corner of the original and the replacement PCB assemblies.

4.33.29 Remove the eight screws around the PCB perimeter securing it to the panel chassis. Remove the bracket securing the data cable to the ferrite blocks.

4.33.30 Carefully disconnect the translucent data cables and encoder wire harnesses from the PCB, then remove the assembly.

4.33.31 Install the replacement PCB - reconnect the data cables and encoder wire harness to the PCB. The green wire on the five-pin connector attaches to Pin 1 on the PCB as identified by a white marking. The blue wire on the two-pin connector attaches to Pin one on the PCB as identified by a white marking. Refer to Figure 4-33 and Figure 4-34.

CAUTION: These wire harnesses are not keyed. Be certain they are attached in the proper orientation as noted in the above step.

4.33.32 Reinstall the eight screws to secure the PCB to the panel chassis. Reattach the bracket securing the data cable to the ferrite blocks. Apply a small amount of Red Insulating Varnish between the screws and the PCB or ferrite mounting bracket.

CAUTION: Do Not over-torque the mounting screws.

4.33.33 Set the display bezel in place and reconnect its data cable to the motherboard. While holding the bezel in place, reattach the front bar with the three screws that were previously removed.

4.33.34 Reinstall the front bumper.

4.33.35 Restore AC power and enable the circuit breakers.

4.33.36 Turn the System Power switch to ON and verify all front panel Leds illuminate, then verify the ventilator successfully completes its self-test routine.

Divan Front Panel LED & Bargraph and Alphanumeric Display Replacement Procedure:

4.33.37 Turn the System Power switch to STANDBY.

4.33.38 Disconnect AC Power from the machine and pull all circuit breakers to their 'out' position.

CAUTION: Use ESD precautions when handling any of the Divan electronics assemblies. These boards contain static sensitive components

4.33.39 Remove the front bumper from the ventilator chassis by removing the five screws on the underside of the front bumper; one screw at the right side rail; three screws securing the left side of the bumper to the bag pole, in order to swing the bumper away from the ventilator. See Figure 4-32.

4.33.40 Remove the three screws holding the front bar (these screws also retain the front display bezel of the ventilator). Set the bar aside and carefully pull the front display bezel downward; carefully disconnect its ribbon cable from the motherboard.

4.33.41 Remove the eight screws around the PCB perimeter securing it to the panel chassis. If replacing the Bargraph/LED display you must also remove the two remaining screws.

4.33.42 Carefully disconnect the translucent data cables and wire harnesses from the PCB, then remove the assembly.

4.33.43 Skip the next three steps if you are replacing the Bargraph/LED display.

4.33.44 Locate the alphanumeric display that is being replaced. Note its orientation and carefully remove it by firmly supporting the daughter board PCB and carefully pulling it straight out of its socket. See Figure 4-35.

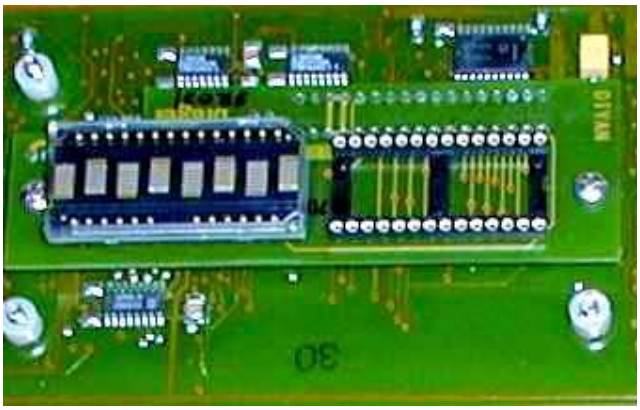

Figure 4-35. Alphanumeric Display

4.33.45 Align the pins on the replacement display with the corresponding sockets on the daughter board and carefully install the replacement display. Verify all pins engage and the LEDs are completely seated.

NOTE: The corner cut out on the display must point towards the word 'DIVAN' on the daughter board PCB.

4.33.46 Skip the next two steps.

4.33.47 Locate the Bargraph and LED display that is being replaced. Note its orientation and carefully remove it by firmly supporting the PCB and carefully pulling it straight out of its socket. See Figure 4-36.

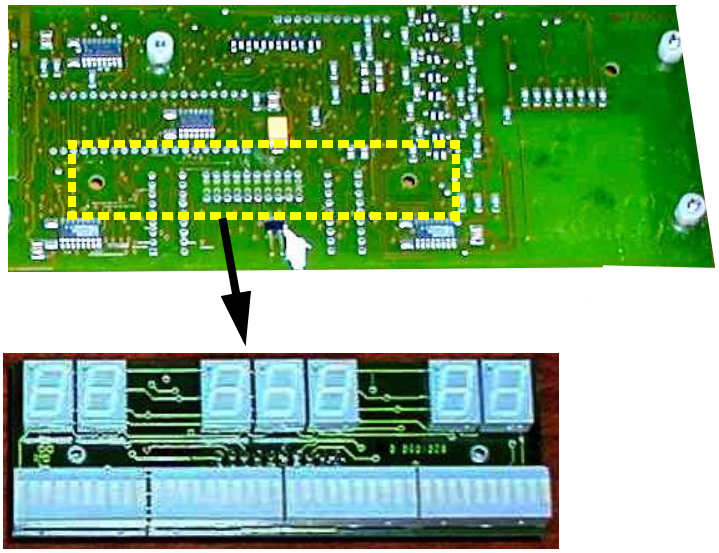

Figure 4-36. Bargraph Display

4.33.48 Align the pins on the replacement LED PCB with the corresponding sockets on the motherboard and carefully install the PCB. Verify all pins engage and the display is completely seated.

4.33.49 Reinstall the PCB and reconnect the data cables and encoder wire harness to the PCB. The green wire on the five-pin connector attaches to Pin 1 on the PCB as identified by a white marking. The blue wire on the two-pin connector attaches to Pin one on the PCB as identified by a white marking. Refer to Figure 4-33 and Figure 4-34.

CAUTION: These wire harnesses are not keyed. Be certain they are attached in the proper orientation as noted in the above step.

4.33.50 Reinstall the eight screws to secure the PCB to the panel chassis. Reattach the bracket securing the data cable to the ferrite blocks. Apply a small amount of Red Insulating Varnish between the screws and the PCB or ferrite mounting bracket.

CAUTION: Do Not over-torque the mounting screws.

4.33.51 Set the display bezel in place and reconnect its data cable to the motherboard. While holding the bezel in place, reattach the front bar with the three screws that were previously removed.

4.33.52 Reinstall the front bumper.

4.33.53 Restore AC power and enable the circuit breakers.

4.33.54 Turn the System Power switch to ON and verify all front panel Leds illuminate, then verify the ventilator successfully completes its self-test routine.

4.34 Integrated Patient Monitor (IPM) Replacement Procedure

The Integrated Patient Monitor asembly is contained in a replaceable module that slides into an opening in the left (facing the front of the machine) side of the machine. Access to connections at the back of the pod require removal of the flowmeter housing back cover. The genral arrangement is shown in Figure 4-37.

CAUTION: All IPM pods are shipped from DMI with the current version software and mechanical modifications. If the IPM's original part number is 4113465-001, then 2.06 upgrade kit P/N 4117240 and IPM Operator's Manual P/N 4116574-002 must be installed to ensure proper system performance. If the original IPM part number can not be determined, use the Narkomed 6000 system software to determine if the upgrade is required. All units with software version < 2.06 require these updates.

4.34.1 Turn the System Power switch to STANDBY.

4.34.2 Remove AC power from the machine and pull all circuit breakers to their 'out' position.

4.34.3 Loosen the captive mounting screw on the IPM module and carefully remove the assembly from the machine.

4.34.4 While supporting the IPM, disconnect the Vitalbus cable.

4.34.5 Record the serial number of the removed IPM on the report.

4.34.6 Record the serial number of the replacement IPM on the report. Update the new part number and serial number in the Narkomed 6000's Service Parts notebook at the completion of this procedure.

4.34.7 Reconnect the Vitalbus cable to the replacement IPM.

4.34.8 Slide the IPM into the machine and secure it with its captive screw.

4.34.9 Restore AC power to the machine and enable the circuit breakers.

4.34.10 Access the Primary Service Screen. (Refer to Accessing the Service Screens in Section 2.1 of this manual.)

4.34.11 Access the Advanced Service Mode. (refer to Accessing the Service Screens in Section 2.2 of this manual.) Select Service Config key, NM6K tab, select the SERVICE button and enter your Technicians ID#.

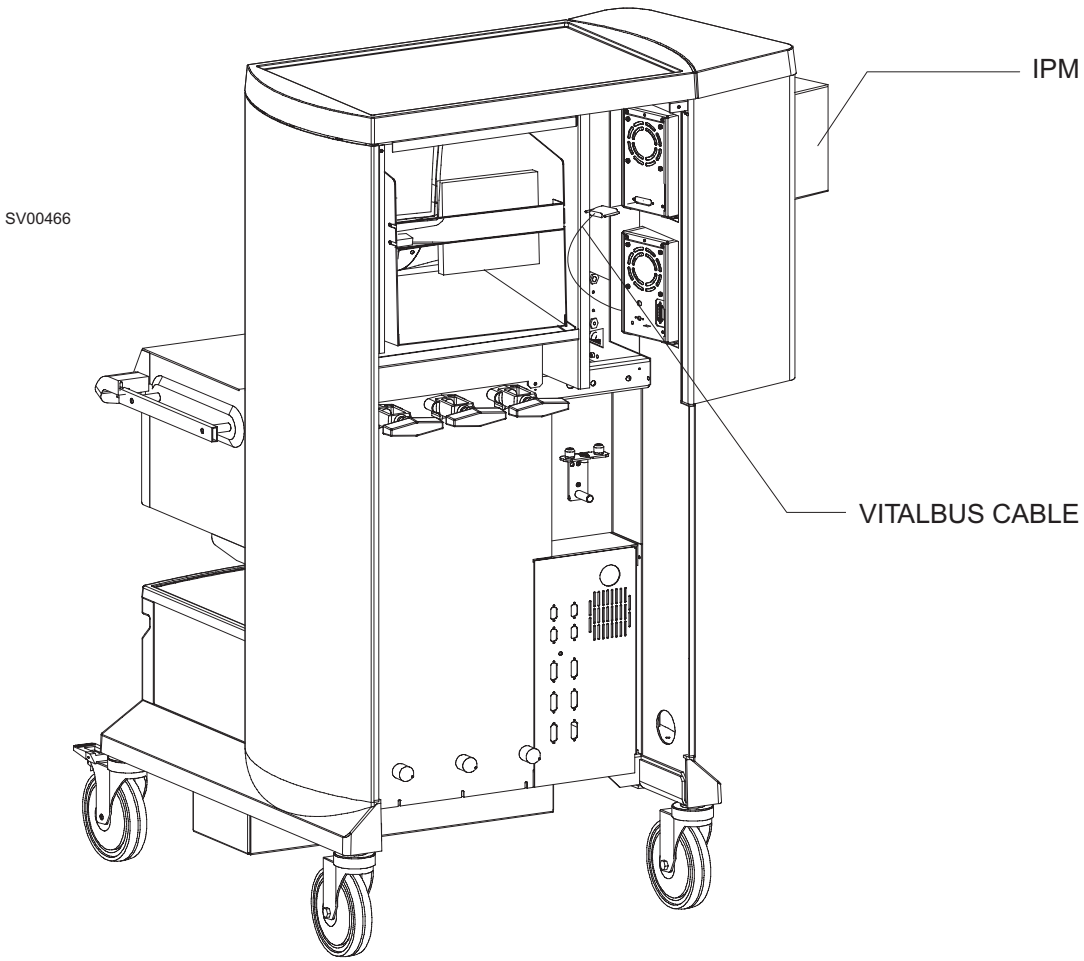

Figure 4-37. Integrated Patient Monitor Replacement

4.34.12 Touch the Update tab in the NM6000 CONFIGURATION to access the UPDATE page. (Refer to Update Page in Section 2.4.2 of this manual.) Press the VPO and GAP Pod Base keys to initiate the POD Base download. Also press CV and SCR keys if these options are present. See Figure 4-37A.

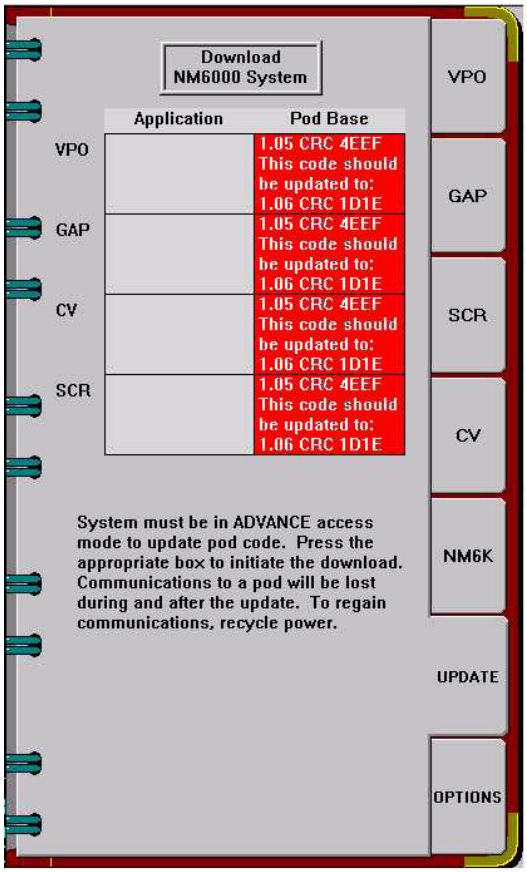
Download NM6000 System
Application
Pod Base
VPO
GAP
CV
SCR
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
1.05 CRC 4EEF This code should be updated to: 1.06 CRC 1D1E
System must be in ADVANCE access mode to update pod code. Press the appropriate box to initiate the download. Communications to a pod will be lost during and after the update. To regain communications, recycle power.
VPO
GAP
SCR
CV
NM6K
UPDATE
OPTIONS

Figure 4-37A. NM6000 Service Config Notebook Update Page

NOTE: When the key is pressed, the notebook disappears. Press the service config key to refresh the service config notebook.

4.34.13 After download is complete, exit from Service mode and cycle power.

4.34.14 Verify all pods display Pod Based Software version 1.06 and CRC value 1D1E.

4.34.15 Perform the IPM test procedure given in Section 6A of this manual.

4.35 Divan Motor Drive Assembly P/N M31461 (RAT P/N M31867)

The motor drive assembly is contained within the Divan chassis. Access to this assembly requires the Divan to be removed form the Narkomed 6000. The following procedure outlines the removal and replacement sequence.

4.35.1 Follow the Divan replacement procedure given in Section 4.16.

CAUTION: Use ESD protection when servicing the Divan assembly. Static discharge can damage PCB components.

4.35.2 Remove the Divan top rear cover.

4.35.3 Remove the PCB cover, then remove the angled blind plate.

4.35.4 Loosen the cap screws securing the hinge assembly to the chassis at the rear of the assembly.

4.35.5 Remove the screw securing the five wires at the ground wire junction on the chassis grounding plate. See Figure 4-38.

4.35.6 Disconnect the fan power cable.

4.35.7 Disconnect the motor drive power cable.

4.35.8 Loosen the two front and two rear screws securing the motor drive assembly to the chassis, and remove the assembly.

4.35.9 Transfer to the four screws and lockwashers to the replacement motor drive assembly, then install and secure the assembly in the chassis.

4.35.10 Reconnect the fan power cable.

4.35.11 Reconnect the five wires at the ground wire junction with the hardware that was previously removed.

4.35.12 Reconnect the drive motor power cable to its mating connector. Route the cable and machine ground wire through the rubber grommet at the top of the chassis grounding plate.

4.35.13 Align the hinged cover bracket between the two flat washers, and center the cover between the left and right sides of the Divan. Secure the bracket.

4.35.14 Reinstall the angled blind plate, then reinstall the circuit board cover with the hardware previously removed.

4.35.15 Reinstall the Divan in the machine. Refer to the Divan replacement procedure given in Section 4.16.

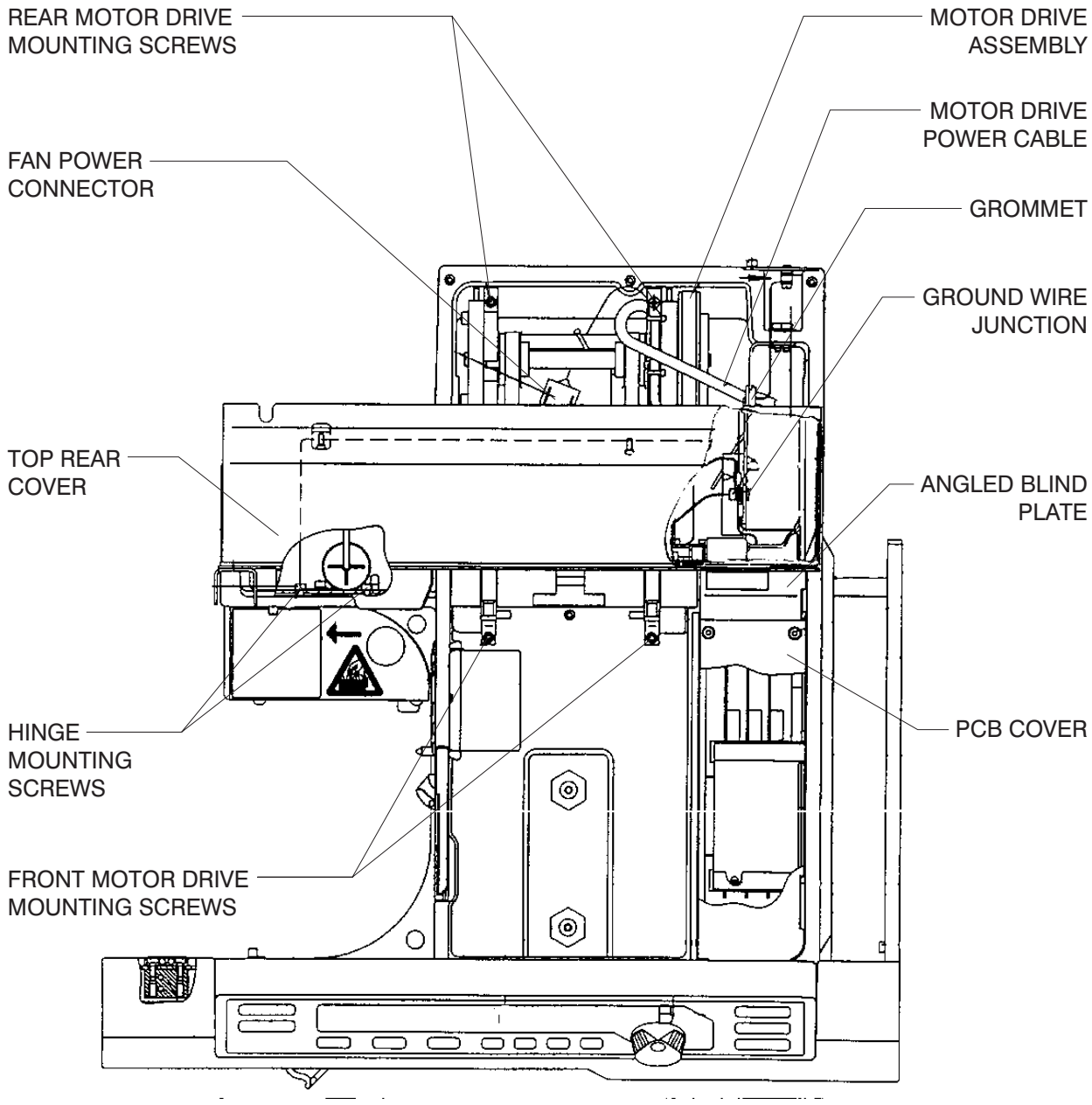

Figure 4-38. Divan Motor Drive Replacement

4.36 Divan PEEP Valve P/N 8406516

The PEEP valve assembly is contained within the Divan chassis and is located on the pneumatic assembly. Access to this assembly requires the Divan to be removed from the Narkomed 6000. The following procedure outlines the removal and replacement sequence.

4.36.1 Follow the Divan replacement procedure given in Section 4.16.

CAUTION: Use ESD protection when servicing the Divan assembly. Static discharge can damage PCB components.

4.36.2 Remove the PCB cover plate. See Figure 4-39.

4.36.3 Remove the PC board retainer.

4.36.4 Disconnect the data ribbon cable from CPU2 and ADDA PCBs.

4.36.5 Remove the circuit boards from the motherboard.

4.36.6 Tuck all exposed Divan wires and cable into the housing and lay the assembly on its back with the bottom of the assembly facing you.

4.36.7 Remove the three screws holding the front bar of the ventilator chassis. (These screws also retain the front display bezel of the ventilator.) Set the bar aside. Carefully pull the front display bezel downward, and carefully disconnect its ribbon cable from the motherboard. Set the assembly aside.

4.36.8 Remove the three screws securing the bottom plate (containing the pneumatic assembly and motherboard) to the Divan chassis. One screw is located at each side near the edge, and one with a flat washer is located at the center.

4.36.9 Pivot the front of the assembly open far enough to gain access to the blue hose from the condensate drain. Disconnect the hose. Use a tie strap to support the front of the assembly at approximately a 45-degree angle.

4.36.10 Locate the PEEP valve assembly (see Figure 4-40).

4.36.11 Remove the two button head screws securing the solenoid and dosage brackets to the PEEP valve, and set these brackets aside.

4.36.12 Disconnect the pneumatic tubes from the PEEP valve.

4.36.13 Remove the two pan head screws, lock washers and shoulder spacers securing the PEEP valve to its bracket.

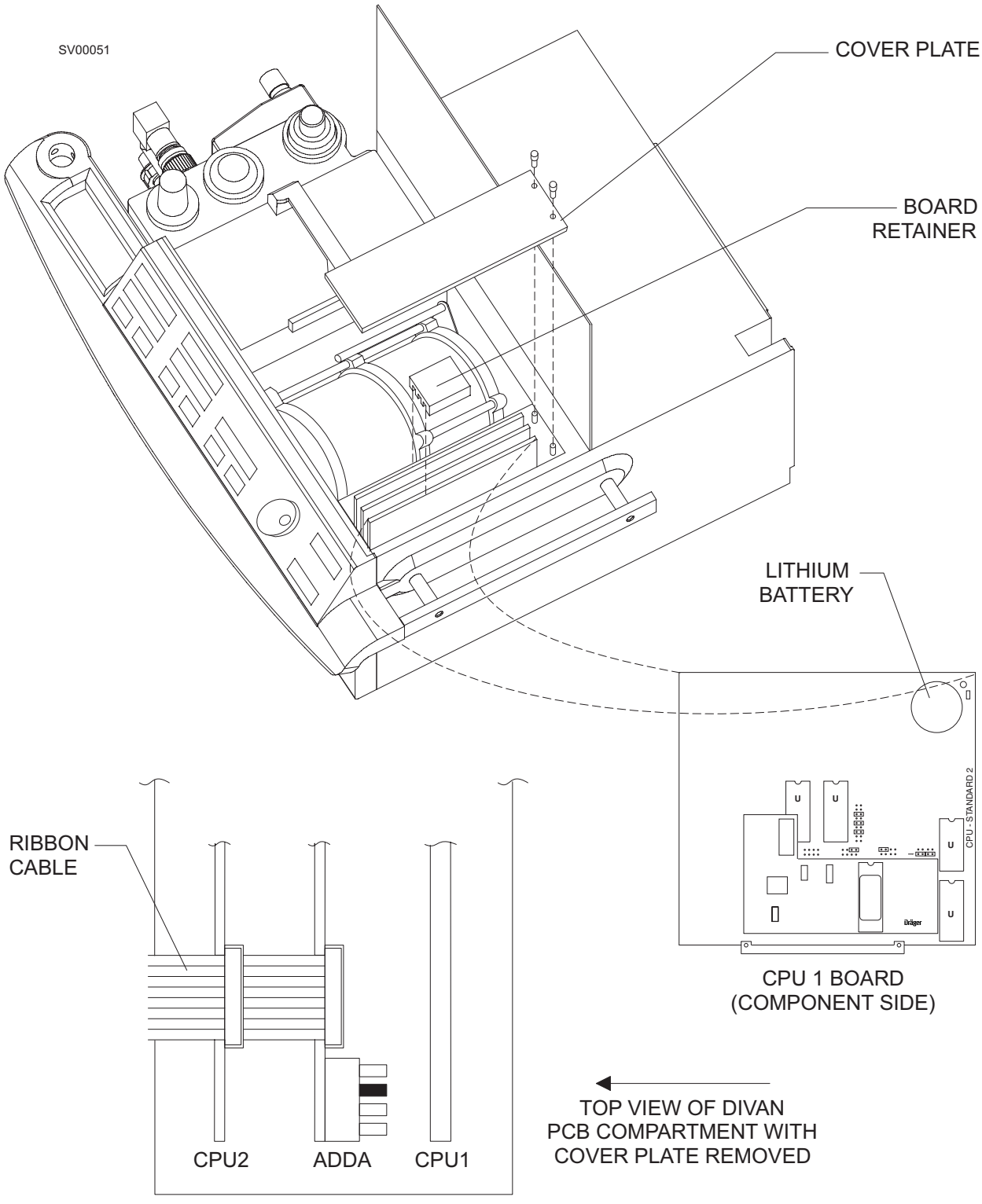

Figure 4-39. Location of PCB Assemblies

SV00603

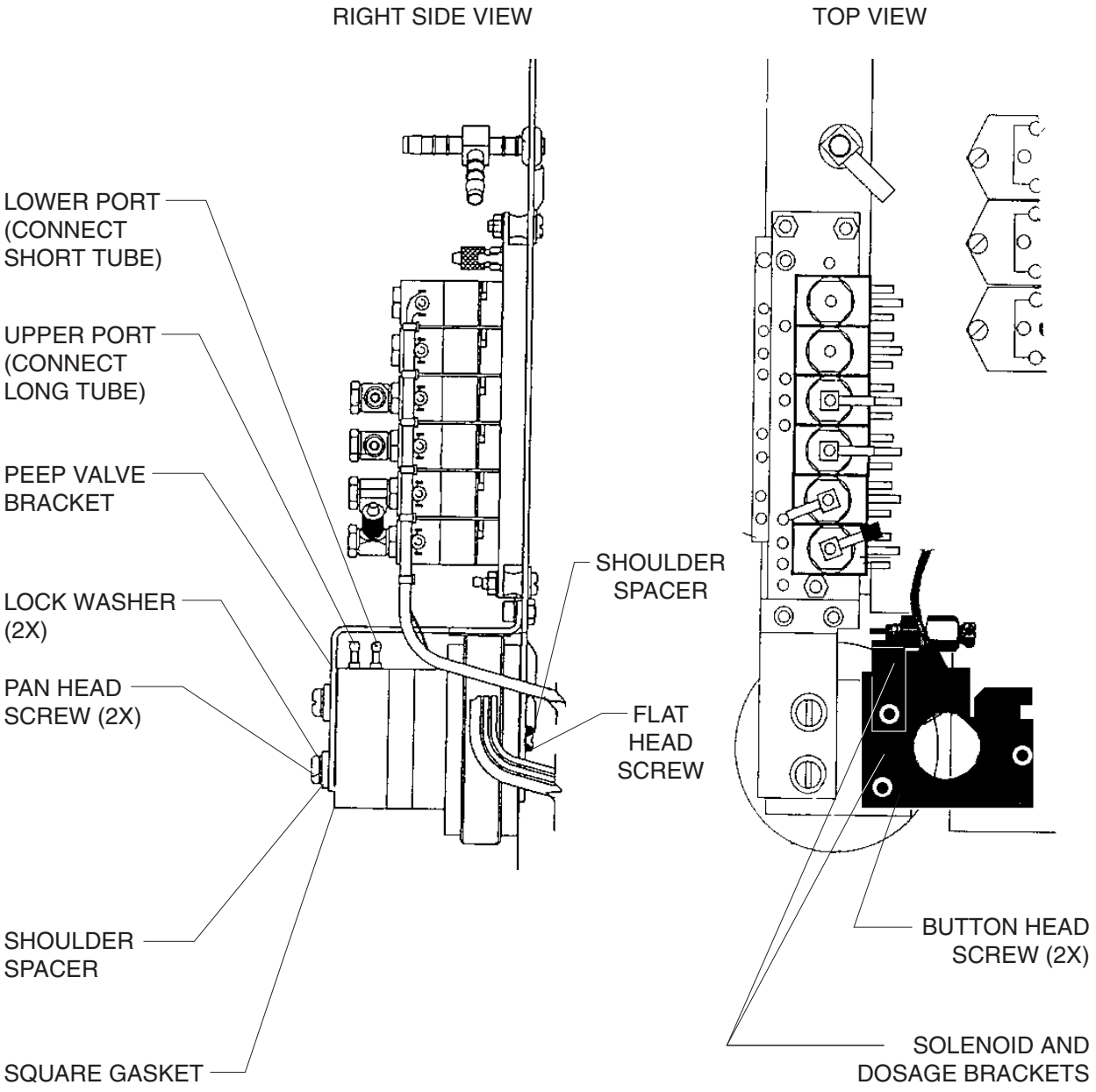

Figure 4-40. Divan PEEP Valve Replacement

4.36.14 Remove the square gasket from the top of the PEEP valve.

4.36.15 Rotate the PEEP valve 90 degrees to the right to gain access to the electrical connections.

4.36.16 Un-solder the wires from the PEEP valve.

NOTE: If the original valve has a resistor across its terminals, discard the resistor.

4.36.17 Remove the small flat head screw and shoulder spacer below the pneumatic assembly plate, then remove the PEEP valve.

4.36.18 Position the replacement PEEP valve with its terminals facing to the right.

4.36.19 Apply purple Loctite #222 to the threads of the small flat head screw. Insert the screw through the shoulder spacer, then align the center of the PEEP valve to the access hole and secure the valve. Do not tighten. Move the valve back and forth to ensure the shoulder of the spacer falls into the recess of the valve, then secure the assembly.

4.36.20 If a resistor is supplied with the replacement PEEP valve, solder the resistor to the PEEP valve terminals.

NOTE: If a resistor is needed it will be taped to the valve body and its value will be printed on the valve near the terminals.

4.36.21 Slip short lengths of shrink tubing on the wires and re-solder the wires to the PEEP valve with the red wire to the (+) positive terminal, and the black wire to the (-) negative terminal.

4.36.22 Rotate the assembly 90 degrees to the left.

4.36.23 Reattach the pneumatic tubes to the valve. The short orange/clear tube connects to the lower port; the long clear tube connects to the upper port.

4.36.24 Slide the square gasket between the top of the PEEP valve and its mounting bracket, and align it with the holes in the PEEP valve.

4.36.25 Apply purple Loctite #222 to the threads of the two pan head screws, and attach the PEEP valve to the mounting bracket with the screws, lock washers and shoulder spacers.

4.36.26 Align the solenoid and dosage brackets to the PEEP valve as shown in the illustration, and secure the brackets with the button head screws and lock washers that were previously removed.

4.36.27 Reconnect the blue tube to the condensate drain.

4.36.28 Remove the tie strap used to prop up the pneumatic assembly panel. Engage the tabs on the panel with the corresponding slots in the Divan chassis and close the panel. Apply Loctite #222 to the threads of the screws previously removed, and secure the panel.

4.36.29 Set the front display bezel in place and reconnect its data cable to the motherboard. While holding the bezel in place, reattach the front bar with the three screws that were previously removed.

4.36.30 Set the Divan upright and pull its cables out from the housing.

4.36.31 Reinstall the circuit boards into their correct locations on the motherboard, making sure each is fully seated. See Figure 4-39.

4.36.32 Reconnect the data ribbon cable to the CPU2 and ADDA PCBs.

4.36.33 Reinstall the board retainer on top of the PC boards.

4.36.34 Reinstall the cover plate over the PC boards (at completion of the PMC).

4.36.35 Reinstall the Divan in the machine. Refer to the Divan replacement procedure given in Section 4.16.

4.37 Divan Pressure Sensors: PCB P/N 8200785 and P/N 8200599

The pressure sensors contained within the Divan chassis and are located on the motherboard. Access to this assembly requires the Divan to be removed from the Narkomed 6000. The following procedure outlines the removal and replacement sequence.

4.37.1 Follow the Divan replacement procedure given in Section 4.16.

CAUTION: Use ESD protection when servicing the Divan assembly. Static discharge can damage PCB components.

4.37.2 Remove the PCB cover plate. See Figure 4-39.

4.37.3 Remove the PC board retainer.

4.37.4 Disconnect the data ribbon cable from CPU2 and ADDA PCBs.

4.37.5 Remove the circuit boards from the motherboard.

4.37.6 Tuck all exposed Divan wires and cable into the housing and lay the assembly on its back with the bottom of the assembly facing you.

4.37.7 Remove the three screws holding the front bar of the ventilator chassis. (These screws also retain the front display bezel of the ventilator.) Set the bar aside. Carefully pull the front display bezel downward, and carefully disconnect its ribbon cable from the motherboard. Set the assembly aside.

4.37.8 Remove the three screws securing the bottom plate (containing the pneumatic assembly and motherboard) to the Divan chassis. One screw is located at each side near the edge, and one with a flat washer is located at the center.

4.37.9 Pivot the front of the assembly open far enough to gain access to the blue hose from the condensate drain. Disconnect the hose. Use a tie strap to support the front of the assembly at approximately a 45-degree angle.

4.37.10 Locate the appropriate pressure sensor. Refer to Figure 4-41.

4.37.11 Disconnect the pneumatic tube from the sensor.

4.37.12 Remove the two screws securing the sensor PCB, and carefully unplug it from the motherboard.

4.37.13 Align the pins on the new sensor PCB with the corresponding socket on the motherboard, and carefully insert the sensor PCB.

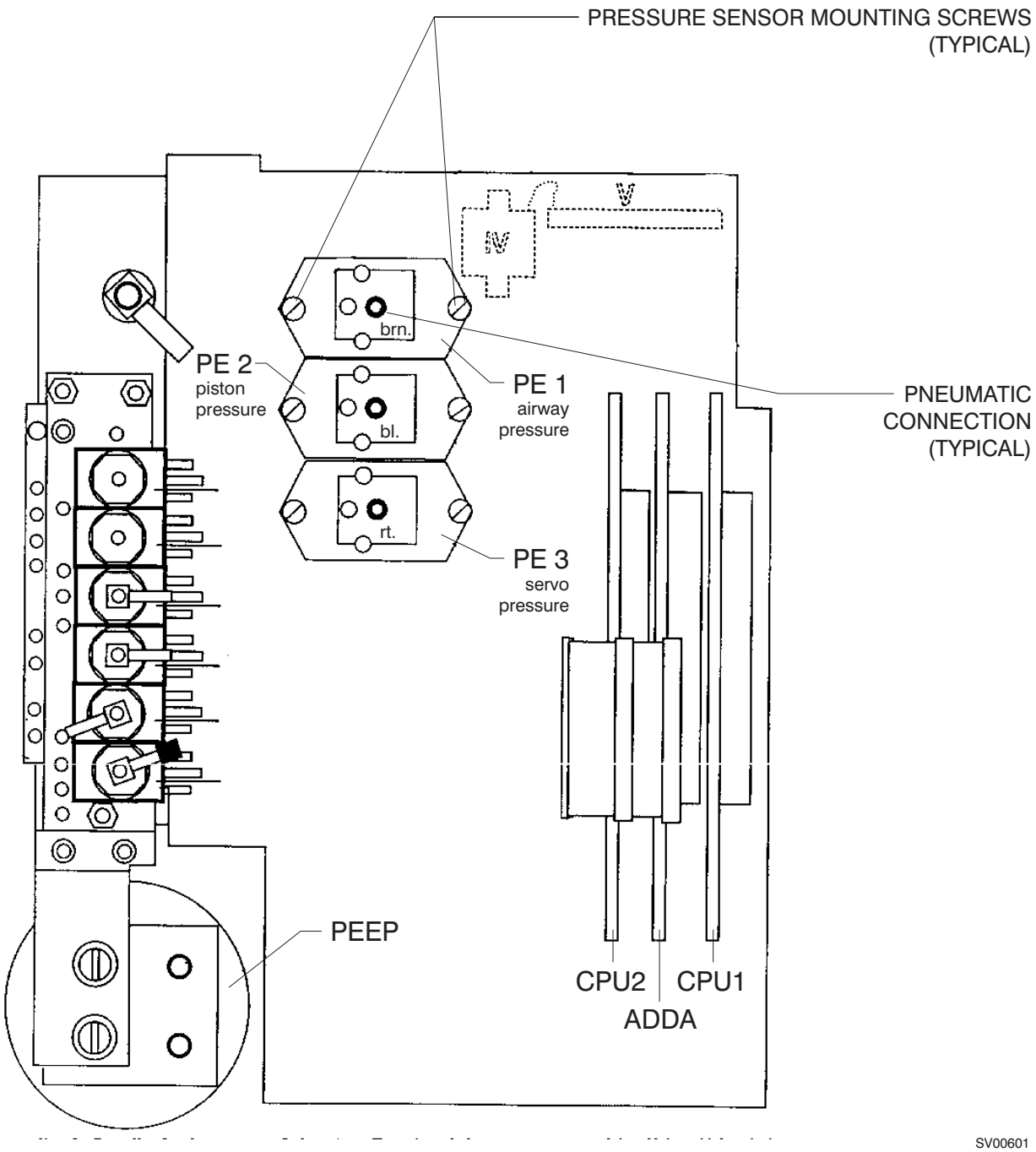

Figure 4-41. Divan Pressure Sensor Locations

4.37.14 Reinstall the sensor PCB retaining screws and secure them by applying Glyptol to the screw heads.

4.37.15 Reconnect the blue tube to the condensate drain.

4.37.16 Remove the tie strap used to prop up the pneumatic assembly panel. Engage the tabs on the panel with the corresponding slots in the Divan chassis and close the panel. Apply Loctite #222 to the threads of the screws previously removed, and secure the panel.

4.37.17 Set the front display bezel in place and reconnect its data cable to the motherboard. While holding the bezel in place, reattach the front bar with the three screws that were previously removed.

4.37.18 Set the Divan upright and pull its cables out from the housing.

4.37.19 Reinstall the circuit boards into their correct locations on the motherboard, making sure each is fully seated. See Figure 4-39.

4.37.20 Reconnect the data ribbon cable to the CPU2 and ADDA PCBs.

4.37.21 Reinstall the board retainer on top of the PC boards.

4.37.22 Reinstall the cover plate over the PC boards (at completion of the PMC).

4.37.23 Reinstall the Divan in the machine. Refer to the Divan replacement procedure given in Section 4.16.

5.0 ADJUSTMENT AND CALIBRATION PROCEDURES

Equipment required:

- Test pressure gauge for setting cylinder pressure regulators
- Oxygen monitor for adjusting Oxygen Ratio Controller
- Test flowmeter for setting ventilator oxygen supply flow rate
- Digital pressure manometer for setting ventilator supply pressure
- Test flowmeter for setting gas analyzer sample flow rate
- Keyboard for performing advanced touch screen calibration, alarm volume adjustment and Time Zone setting

5.1 Cylinder Pressure Regulator Adjustment

5.1.1 Disconnect all pipeline hoses and turn the System Power switch to ON.

5.1.2 Close all cylinder valves except one O_2 valve.

5.1.3 Set the oxygen flow to 4 L/min.

5.1.4 Open the other gas flow control valves to drain pressure from the system.

5.1.5 Close the O2 cylinder valve.

5.1.6 Close all of the flow control valves and press the O_2 Flush valve to drain oxygen pressure from the system.

5.1.7 Turn the System Power switch to STANDBY.

5.1.8 Remove the cylinders from their yokes.

5.1.9 Remove the rear panel below the yokes.

NOTE: Miminum cylinder pressure for this adjustment shall be:
N2O: 600 psi; O2, Air: 1000 psi.

5.1.10 Locate the test port in the regulator output line. The O_2 test port is located on the O_2 manifold; the N_2O or Air test port is located downstream of the N_2O or Air pipeline inlet check valve.

5.1.11 Remove the plug from the port and connect a test gauge (P/N S000063).

5.1.12 Reinstall and open an O_2 cylinder (also reinstall the N_2O or Air cylinder if the N_2O or Air regulator is being adjusted).

5.1.13 Turn the System Power switch to ON.

5.1.14 Set the O_2 flow to 4 L/min. (also set the N_2O or Air flow to 4 L/min. if these regulators are being adjusted).

5.1.15 Remove the acorn nut from the regulator to expose the adjusting screw. For N2O, turn the screw until the test gauge indicates 46 psi. (50 psi for CSA machines). For O2 and Air, use the compensated regulator output setting based on the cylinder pressure given in the following table.

CAUTION: Based on information supplied by the cylinder regulator manufacturer, when the regulator is used for O2 or Air, its output pressure will decrease 0.5 psi for every 100 psi increase in cylinder pressure above 1000 psi. Currently, these pressure regulators are calibrated at 47 psi with a cylinder supply of 1000 psi. If a 2000 psi cylinder is then installed, the regulator output will be 42 psi. This change in output must be compensated for to provide accurate performance throughout the cylinder's working range.

NOTE: Cylinder pressure compensation for the N2O regulator is not required.

Cylinder Pressure (psi)	Compensated Regulator output setting (psi)	Compensated Regulator output tolerances (-4/+2)
2000	**42** (*45)	38 - 44 (*41 - 47)
1800	**43** (*46)	39 - 45 (*42 - 48)
1600	**44** (*47)	40 - 46 (*43 - 49)
1400	**45** (*48)	41 - 47 (*44 - 50)
1200	**46** (*49)	42 - 48 (*45 - 51)
1000	**47** (*50)	43 - 49 (*46 - 52)

* Canada settings

5.1.16 Verify the adjusted regulator maintains its compensated output tolerance.

5.1.17 If the O2 cylinder regulator output was adjusted, perform the following test:

5.1.17.1 Set the ventilator to Volume Mode ventilation.

5.1.17.2 Set the Auxiliary O2 and Fresh Gas O2 flows to 10 L/min.

5.1.17.3 Press the O2 Flush and verify the Lo O2 Supply alarm is not active. If the alarm is active refer to Section 5.2: Oxygen Supply Pressure Alarm Switch Adjustment.

5.1.18 Reinstall the acorn nut on the regulator.

5.1.19 Close the cylinder valves and allow pressure to drain from the system.

5.1.20 Close the flow control valves and turn the System Power switch to STANDBY.

5.1.21 Disconnect the test gauge from the test port and reinstall the plug.

5.1.22 Remove the cylinder(s) and reinstall the rear panel on the machine.

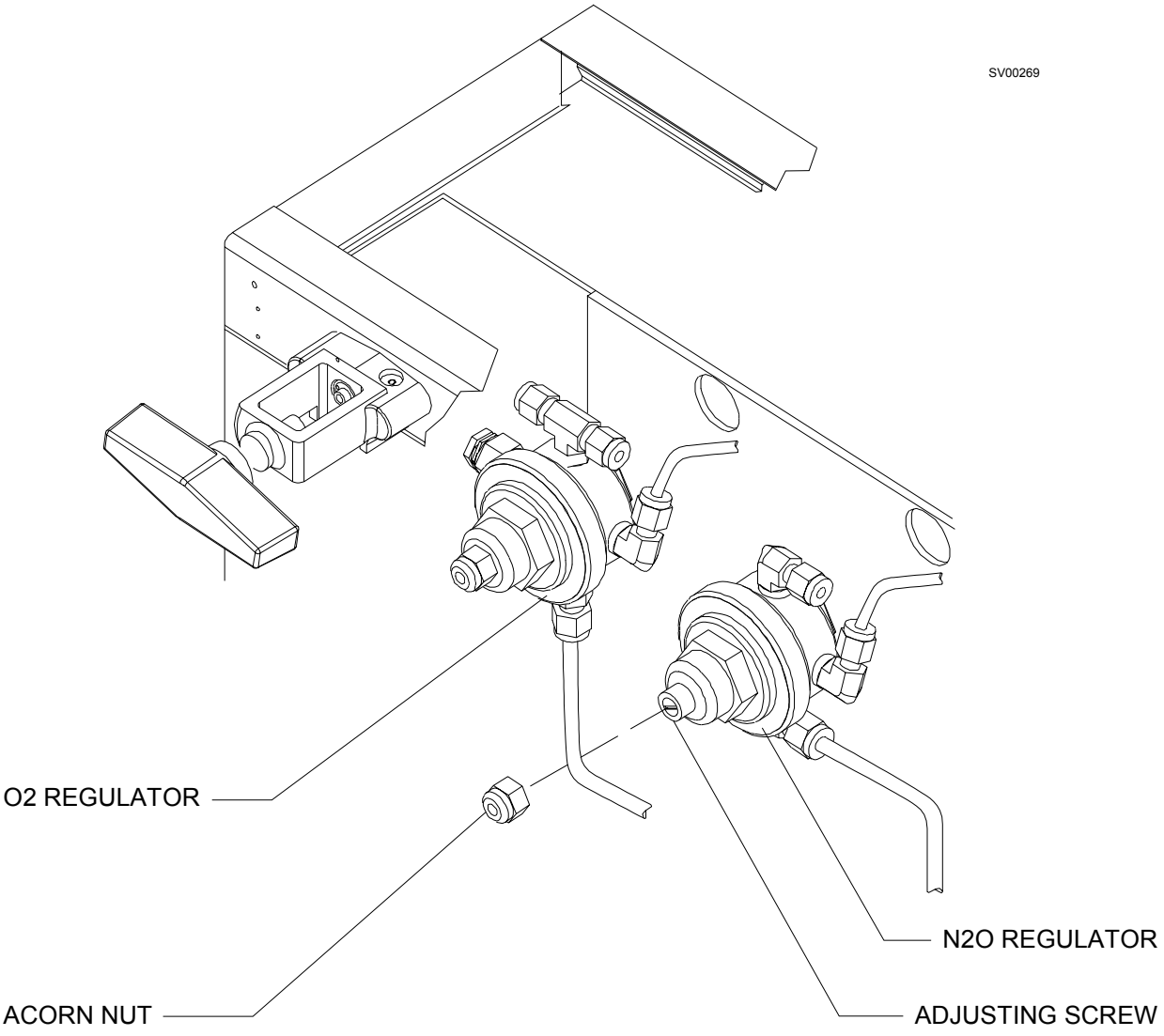

Figure 5-1. Cylinder Pressure Regulator Adjustment

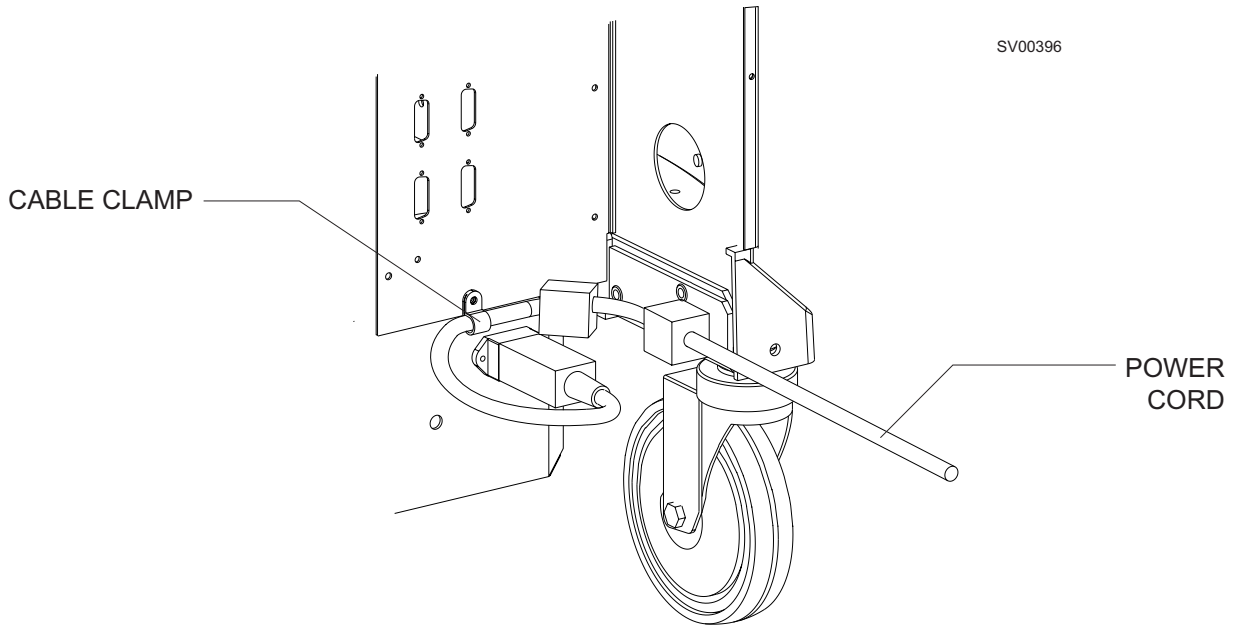

Figure 5-1A. Power Cord Routing

5.1.23 Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole dirrectly above the power cord socket as shown in Figure 5-1A.

5.1.24 Reinstall the cylinders in their yokes.

5.1.25 Perform a High Pressure Leak test on the adjusted regulator's gas circuit. Refer to Section 6.7.

5.1.26 Reconnect the pipeline hoses.

5.1.27 Perform the PMC Procedure given in Section 6.

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5.2 Oxygen Supply Pressure Alarm Switch Adjustment

5.2.1 Disconnect all pipeline hoses and close all cylinder valves.

5.2.2 Press the O_2 Flush valve to drain oxygen pressure from the system.

5.2.3 Turn the System Power switch to STANDBY.

5.2.4 Remove the flowmeter housing back cover.

5.2.5 Loosen the captive mounting screw on the gas analyzer pod and slide the pod outward to gain better access to the flowmeter housing. Do the same for any other pod projecting inside the flowmeter housing.

5.2.6 Locate the O_2 pressure test port. Remove the plug from the port and connect a test gauge.

5.2.7 Open an oxygen cylinder valve and turn the System Power switch to ON.

5.2.8 Set the oxygen flow to 5 L/min.

5.2.9 Close the oxygen cylinder valve.

5.2.10 As the pressure drops, the O_2 SUPPLY alarm should activate when the pressure is between 40 and 34 psi as shown in the test gauge.

5.2.11 If the alarm activates when the pressure is below 34 psi or above 40 psi, turn the adjustment wheel (see illustration), repeat the test and adjust as necessary to bring the set point into the correct range.

5.2.12 Turn the System Power switch to STANDBY.

5.2.13 Disconnect the test gauge and replace the plug in the test port.

5.2.14 Return the gas analyzer pod (and any other pod) to its original position, and tighten its captive mounting screw.

5.2.15 Reinstall the flowmeter housing back cover.

5.2.16 Reconnect the pipeline hoses.

5.2.17 Perform the O2 leak test given in Section 6.7.3.

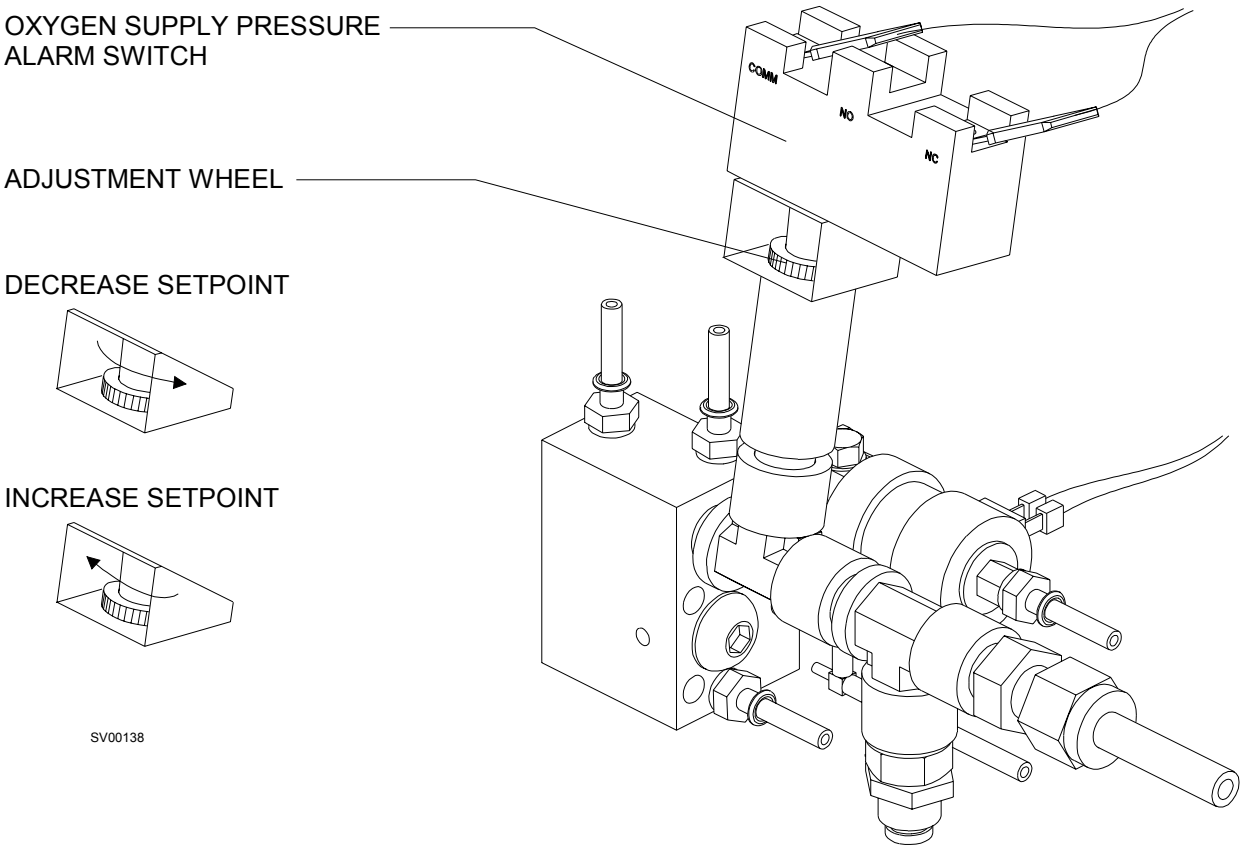


Figure 5-2. Oxygen Supply Pressure Alarm Switch

5.3 Oxygen Ratio Controller (ORC) Adjustment

5.3.1 Remove the flowmeter housing back cover.

5.3.2 Loosen the captive mounting screw on the gas analyzer pod and slide the pod outward to gain better access to the flowmeter housing. Do the same for any other pod projecting inside the flowmeter housing.

5.3.3 Connect a calibrated oxygen monitor to the fresh gas outlet.

5.3.4 Connect the pipeline hoses.

5.3.5 Turn the System Power switch to ON.

5.3.6 Set the O_2 flow to 8 L/min.

5.3.7 Set the N_2O flow to 8 L/min.

5.3.8 Set the O_2 flow to 800 mL/min. for one minute. Verify that the O_2 concentration is between 21% and 29% (N_2O flow of 2.7 to 3.0 L/min.) If needed, loosen the locknut on the ORC and turn the adjusting screw (counter-clockwise to decrease N_2O flow, clockwise to increase N_2O flow) to achieve a nominal O_2 concentration of 25%.

5.3.9 Repeat the previous three steps until no further adjustment is needed. tighten the locknut.

5.3.10 Adjust the oxygen flow to a point where the nitrous oxide flowmeter indicates 8 L/min.

5.3.11 Verify that the O_2 concentration is between 21% and 29% (O_2 flow of 2.1 to 3.3 L/min.).

5.3.12 Slowly decrease the oxygen flow to 800 mL/min. The nitrous oxide flow should decrease proportionally, and the O_2 concentration should remain between 21% and 29%.

5.3.13 Close the O_2 flow control valve, and fully open the N_2O flow control valve. Verify that the O_2 concentration is between 22% and 31%.

5.3.14 Close the N_2O flow control valve and turn the System Power switch to STANDBY.

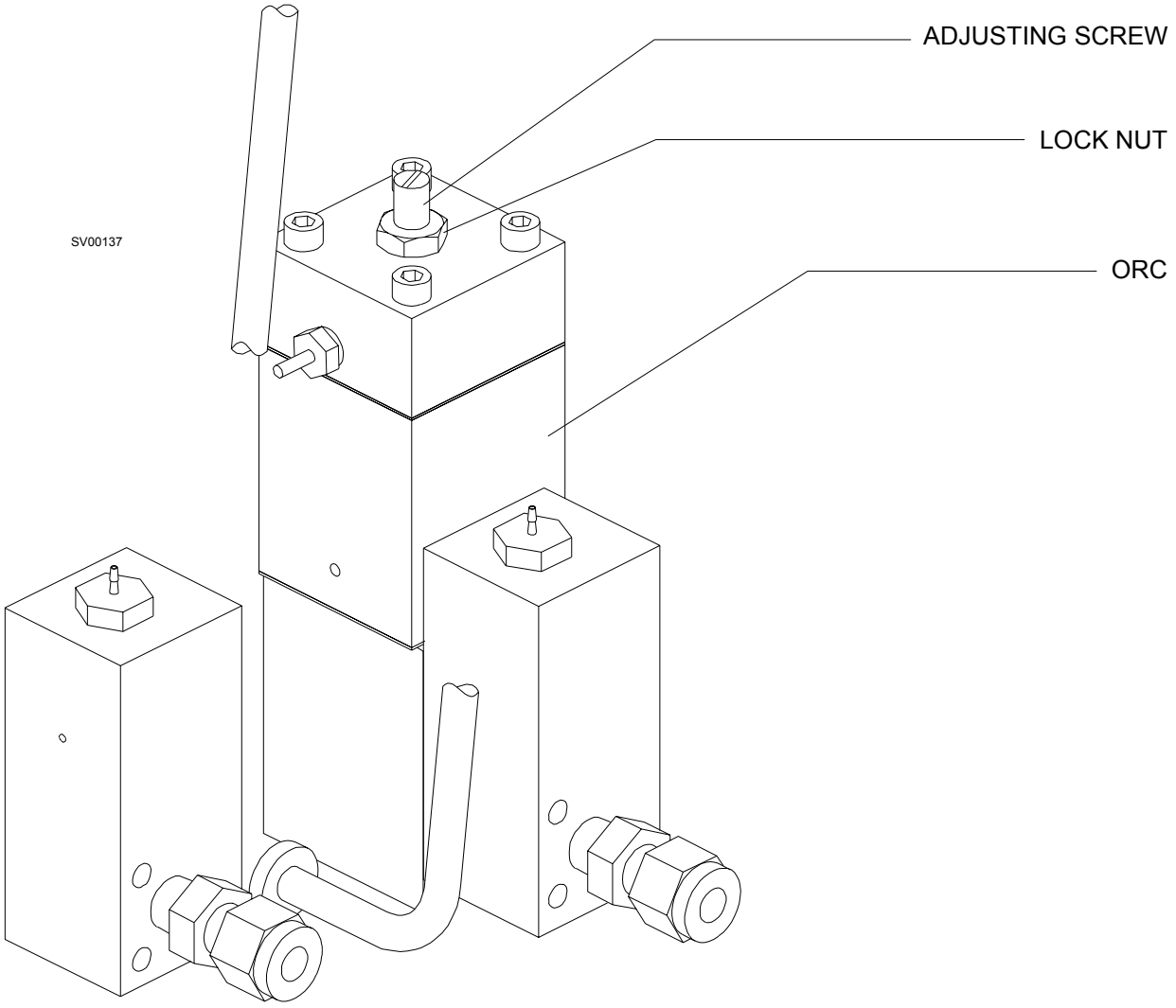


Figure 5-3. Oxygen Ratio Controller Adjustment

5.3.15 Return the gas analyzer pod (and any other pod) to its original position, and tighten its captive mounting screw.

5.3.16 Reinstall the flowmeter housing back cover.

5.4 Oxygen Sensor Calibration

5.4.1 Turn the System Power switch to ON.

5.4.2 Enter the service mode (ref. Section 2) and touch the Service Monitors softkey to display the service monitors notebook.

5.4.3 Touch the Oxygen tab to display the Oxygen Monitor Service Screen page.

5.4.4 Zero Calibration:

5.4.4.1 Remove the oxygen sensor capsule from its housing and allow the Current Cell A and Cell B readings to stabilize for at least 10 seconds.

5.4.4.2 Touch the zero softkey to store the current values as the new zero calibration.

5.4.4.3 Reinstall the sensor capsule in its housing.

5.4.5 21% Calibration:

5.4.5.1 Expose the sensor to ambient air only (away from any open part of the breathing system) and allow it to stabilize for several minutes.

5.4.5.2 Touch the Exit Service key, then touch the O2 Cal key to display the Calibrate O2 dialog box.

5.4.5.3 Touch YES in the dialog box to initiate the 21% O_2 calibration.

During calibration, the Oxygen numbox displays “CAL in Progress.” Following successful calibration, the currently sensed oxygen concentration appears in the Oxygen numbox.

5.4.5.4 When calibration is complete, install the sensor assembly in the inspiratory valve dome.

NOTE: If the O2 sensor will not calibrate properly, refer to the Oxygen Monitoring section of the *Narkomed 6000 Operator’s Instruction Manual* for further information.

5.4.5.5 Test the performance of the Oxygen Analyzer. Refer to Section 6.11 Oxygen Analyzer.

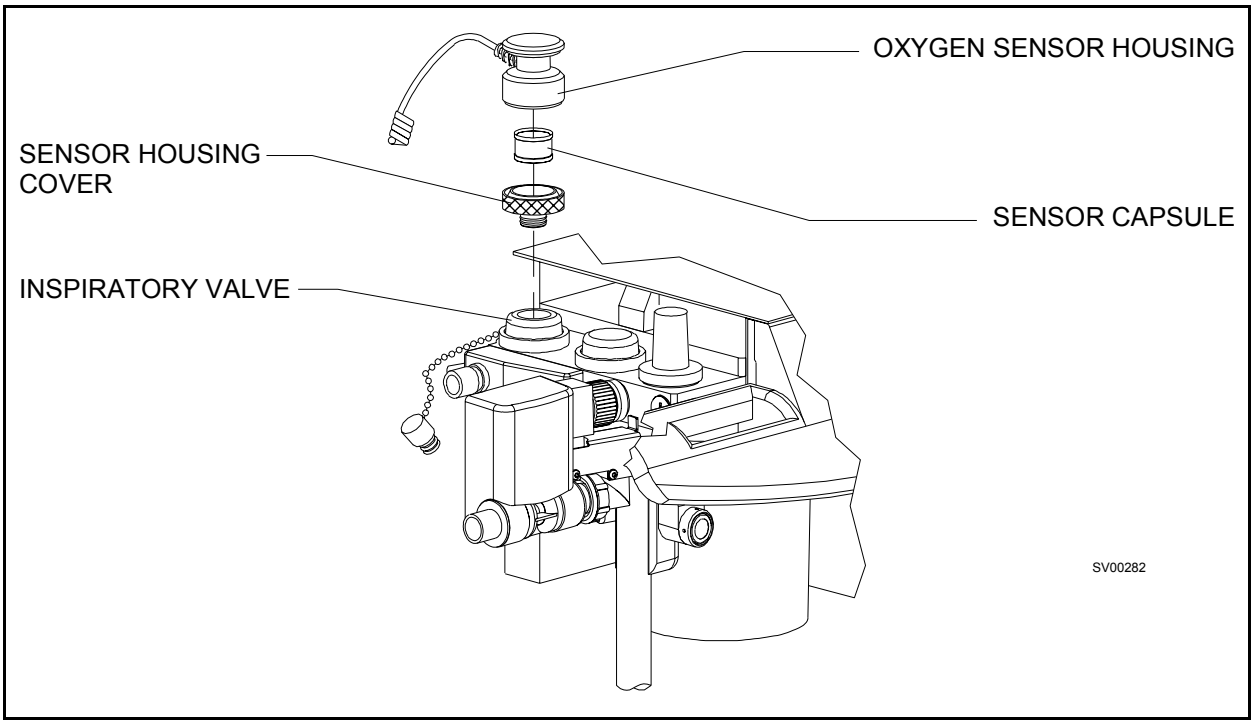
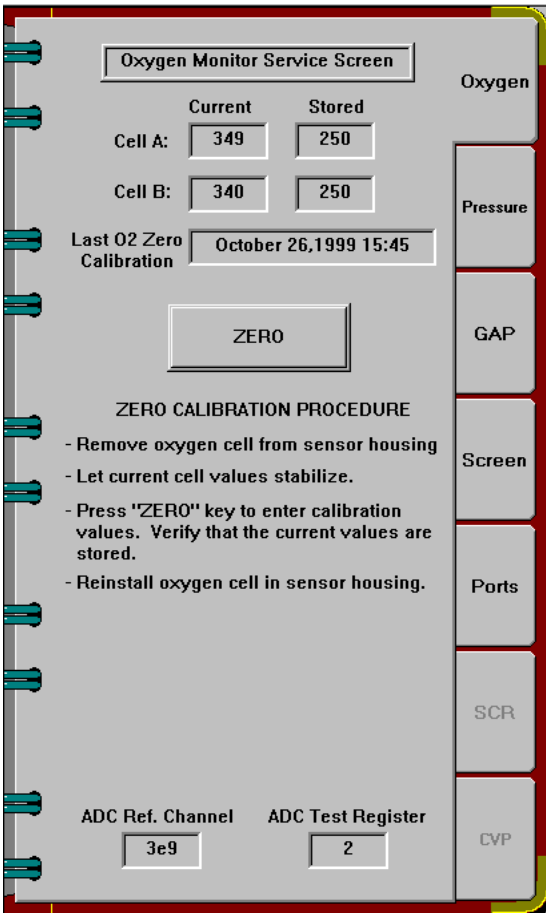
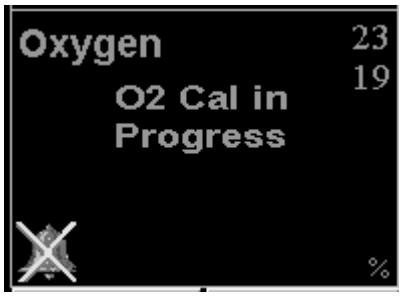
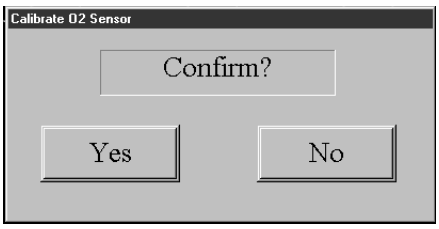


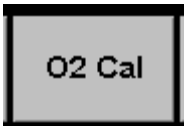
Figure 5-4. Oxygen Sensor Calibration

← **Zero** ↓ **21%**









5.5 Breathing Pressure Monitor Calibration

5.5.1 Turn the System Power switch to ON.

5.5.2 Enter the service mode (ref. Section 2) and touch the Service Monitors softkey to display the service monitors notebook.

5.5.3 Touch the Pressure tab to display the Pressure Monitor Service Screen page.

5.5.4 Zero Calibration:

5.5.4.1 Disconnect the breathing pressure sample line from the breathing system and let the displayed Current Pressure Value stabilize.

5.5.4.2 Touch the ZERO key to enter the new Stored Zero value.

5.5.5 Span Calibration:

5.5.5.1 Connect a test fixture to the breathing pressure sample line as shown in Figure 5-5. Apply a pressure of 50 cm H_2O.

5.5.5.2 When the displayed Current Pressure Value stabilizes, touch the SPAN key to enter the new Stored Span value.

5.5.6 Disconnect the test fixture and reconnect the breathing pressure sample line to the breathing system.

5.5.7 Touch the Exit Service key to return to the monitoring screen.

5.5.8 Test the performance of the pressure monitor. Refer to Section 6.20.

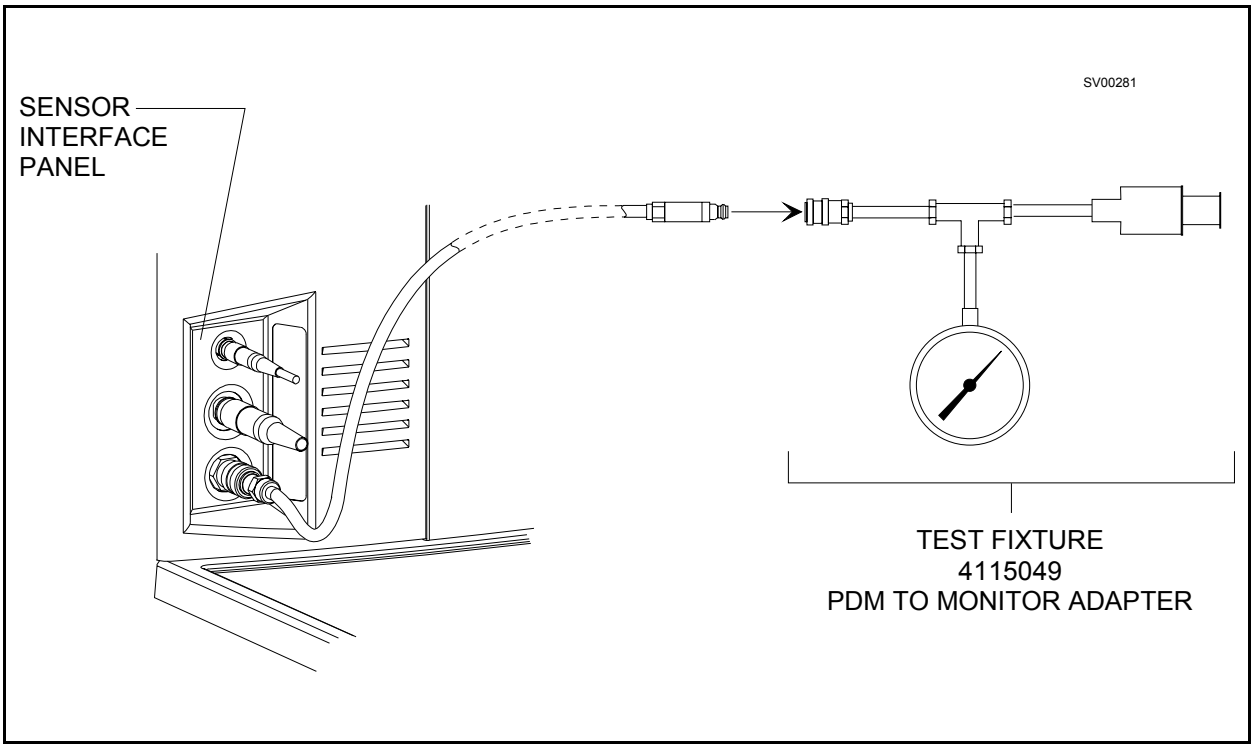
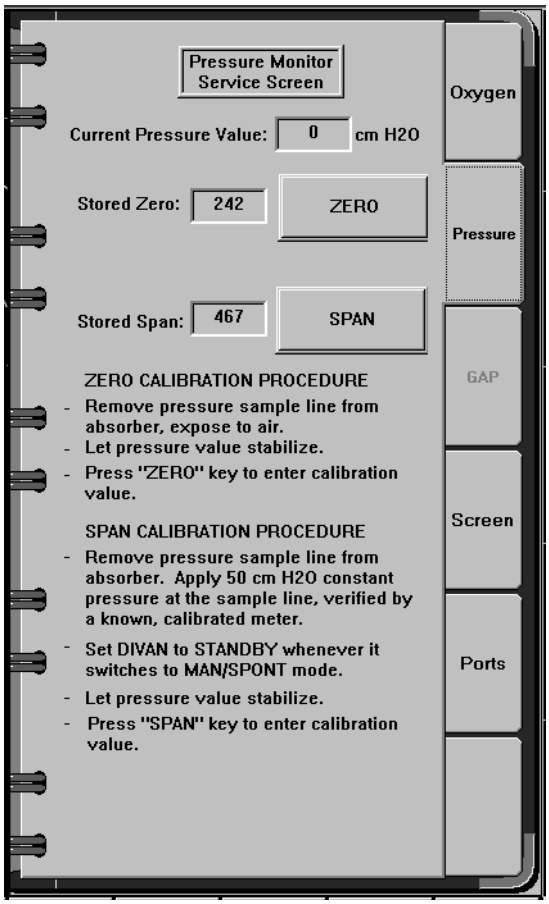


Figure 5-5. Pressure Monitor Calibration


Pressure Monitor
Service Screen
Current Pressure Value: 0 cm H2O
Stored Zero: 242
ZERO
Stored Span: 467
SPAN
ZERO CALIBRATION PROCEDURE
- Remove pressure sample line from absorber, expose to air.
- Let pressure value stabilize.
- Press "ZERO" key to enter calibration value.
SPAN CALIBRATION PROCEDURE
- Remove pressure sample line from absorber. Apply 50 cm H2O constant pressure at the sample line, verified by a known, calibrated meter.
- Set DIVAN to STANDBY whenever it switches to MAN/SPONT mode.
- Let pressure value stabilize.
- Press "SPAN" key to enter calibration value.
Oxygen
Pressure
GAP
Screen
Ports

5.6 Agent Monitor Sample Flow Calibration

NOTE: Agent monitor sample flow and line block calibrations are disabled in startup, reduced accuracy, and ISO accuracy modes.

NOTE: The GAP will remain in hibernation and thus report Agent Warmup for longer than 20 minutes.Applying verification gas, or breathing into the sample line will force a zero-calibration and update the GAP's warm-up status.

5.6.1 Install a fresh reservoir filter, semi-permeable tube, and the type of patient sample line that will be utilized.

CAUTION: Variations of sample line length and internal diameter may affect sample flow and line block calibrations. Calibration is required at initial set up with the end-user-supplied sample line, and whenever a different type of sample line is used.

5.6.2 Remove the flowmeter housing back cover.

5.6.3 Disconnect the exhaust line at the back of the gas analyzer, and connect a test flowmeter to the hose barb on the analyzer.

5.6.4 Turn the System Power switch to ON.

5.6.5 Enter the service mode (ref. Section 2) and touch the Service Monitors softkey to display the service monitors notebook.

5.6.6 Touch the GAP tab to display the Flow Monitor Service Screen page.

5.6.7 Ensure that the flow monitor page displays the ACCURACY MODE: FULL message.

5.6.8 Adjust variable flow restrictor screw to obtain the highest possible flow. See Figure 5-6.

5.6.9 Press the INCREASE FLOW key until maximum flow is reached. Verify flow is greater than 250 mL/min.

5.6.10 Adjust the variable flow restrictor screw to 250 mL.

5.6.11 Adjust flow with flow keys to 200 mL.

5.6.12 Occlude the sample line and verify no flow.
Wait>7 seconds, press STORE HIGH key.
Wait>7 seconds, remove occlusion.

5.6.13 Adjust flow with flow keys to 100 mL.

5.6.14 Occlude the sample line and verify no flow.
Wait>7 seconds, press STORE LOW key.
Wait>7 seconds, remove occlusion.

5.6.15 Flow Calibration Verification:

5.6.15.1 Touch the CO2 numbox and verify the slider is at Min flow.

5.6.15.2 What is the sample flow rate? ___ mL/min. (75 - 125)

5.6.15.3 Adjust the slider bar to Max flow.

5.6.15.4 What is the sample flow rate? ___ mL/min. (175 - 225)

5.6.15.5 Disconnect the test flowmeter and reconnect the exhaust line to the gas analyzer.

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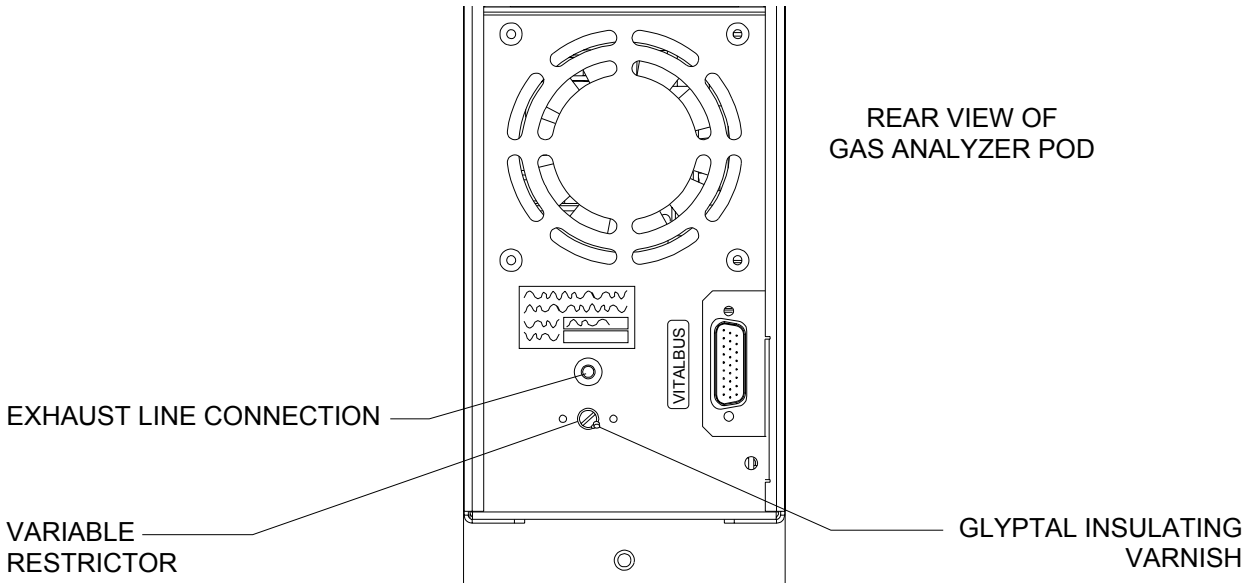


Figure 5-6. Sample Flow Calibration

5.6.16 Line Block Calibration Verification:

5.6.16.1 Connect a capnomed flowmeter test stand to the sample line, using a Luer lock fitting and thread sealant in the port at the top of the flowmeter.

5.6.16.2 Attach the hose at the lower port of the capnomed flowmeter test stand to the hose barb on the auxiliary O2 flowmeter.

5.6.16.3 Turn the auxiliary O2 flowmeter flow control knob until the capnomed flowmeter indicates 75 mL/min.

5.6.16.4 Verify that a CO2 LINE BLOCK message appears on the monitor in approximately 15 seconds.

5.6.16.5 Remove the test equipment and close the auxiliary O2 flow control valve.

5.6.16.6 Verify that the LINE BLOCK message has cleared.

5.6.17 Apply a small amount of Glyptal insulating varnish between the variable restrictor screw and the chassis as shown in the illustration (do not apply varnish to the screw slot).

5.6.18 Reinstall the flowmeter housing back cover.

5.7 CRT Alignment

5.7.1 Remove the upper back cover from the machine.

WARNING: When making CRT adjustments, use only non-metallic alignment tools and be careful not to touch any of the high voltage leads or CRT circuitry.

Figure 5-7. shows the locations of picture size, centering, and rotation adjustments that can be made in the field if needed. These adjustments are located along the top and back edge of the PC board on the left side (facing the back of the CRT) of the chassis.

Contrast and brightness controls are accessible from the underside of the mounting shelf.

NOTE: For adjusting horizontal size, use the control marked HB+ as shown in the illustration. Do not use the control marked 'Horizontal Size.'

NOTE: For horizontal centering, use the control marked Horizontal Phase as shown in the illustration. Do not use the control marked 'Horizontal Centering.'

5.7.2 Reinstall the back cover when adjustments are completed.

5.7.3 Perform the Touch Screen calibration given in this section.

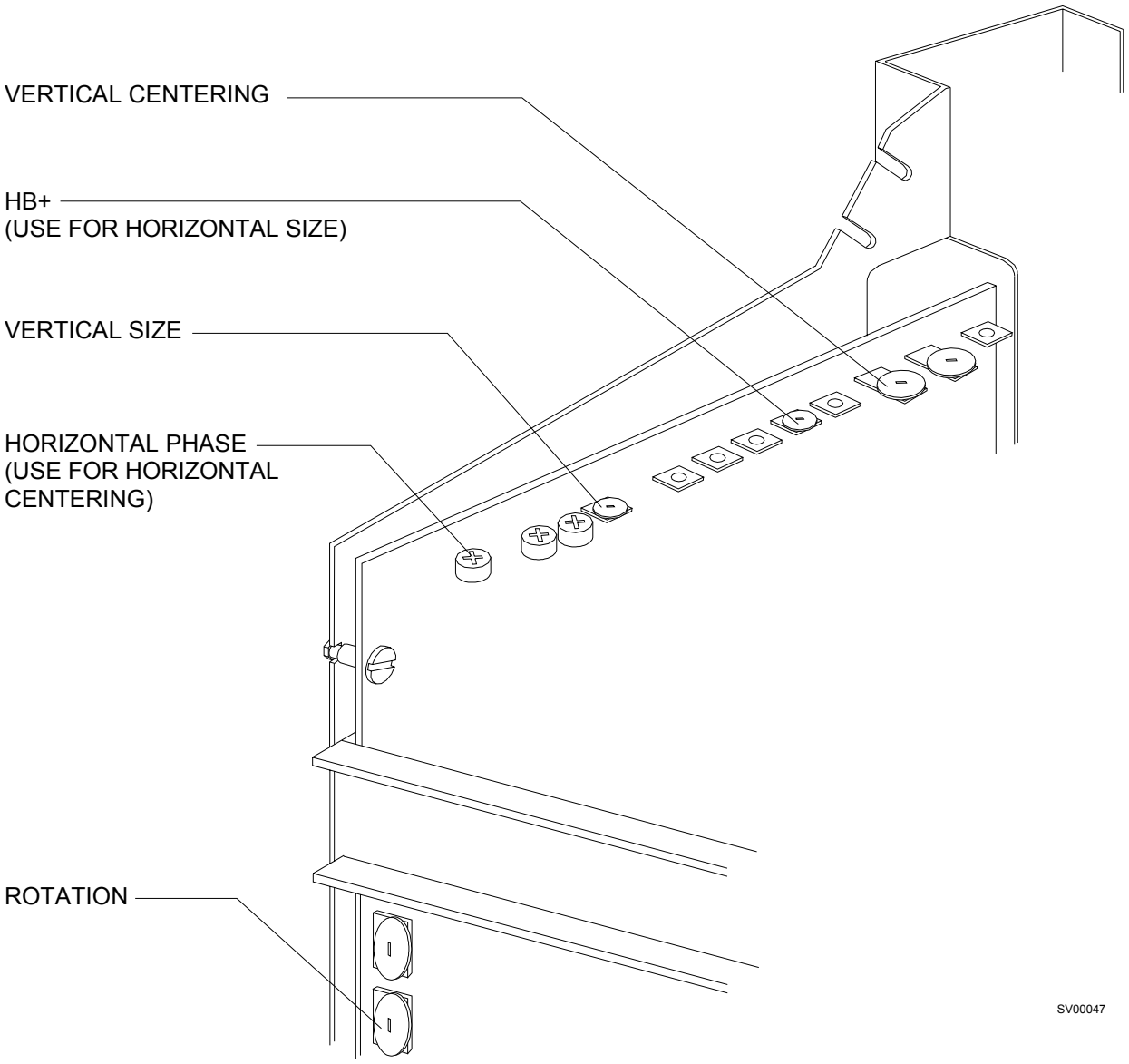


Figure 5-7. CRT Adjustments

5.7A Flat Panel Display Brightness, Contrast, Phase and Video Position adjustments

Note: These adjustments are neeeded whenever a display panel or WPU is replaced, or whenever a CRT is replaced by a flat panel display. If it is necessary to readjust the display for a change in ambient light, a complete calibration is needed, including phase adjustment. This calibration should be performed at room ambient temperature, with the temperature compensation phase adj on the display at 2 or less.

5.7A.1 Remove the table lamp panel below the display, and pull it forward far enough for access to the small PCB assembly attached to the back of this panel. The control keys on this assembly are used for selecting display functions, and for making the display adjustments. See Figure 5-7A.

5.7A.2 Press the FUNC key to bring up the On Screen Display (Figure 5-7B).

5.7A.3 Verify the width setting is 127.

Note: **Do Not** Adjust width - as it affects brightness, contrast and phase.

5.7A.4 Enter the service mode (ref. Section 2) and touch the Service Monitors softkey to display the service monitors notebook. If the touch screen is completely unresponsive, perform the Advanced Touch Screen Calibration (refer to Paragh 5.8A).

5.7A.5 Touch the Screen tab to display the Screen Functions page as shown in Figure 5-7C.

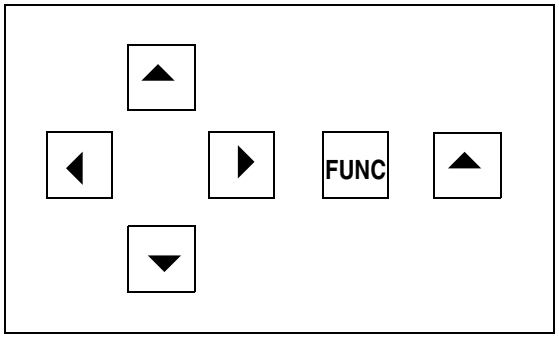


Figure 5-7A. OSD Control Keys

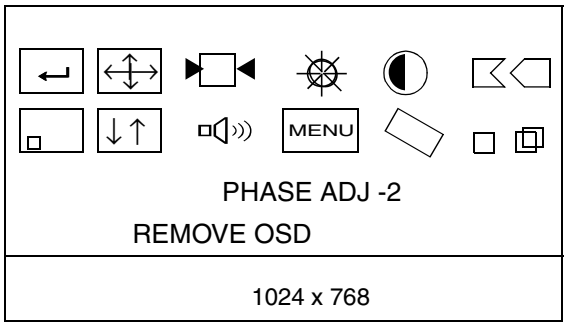


Figure 5-7B. On Screen Display

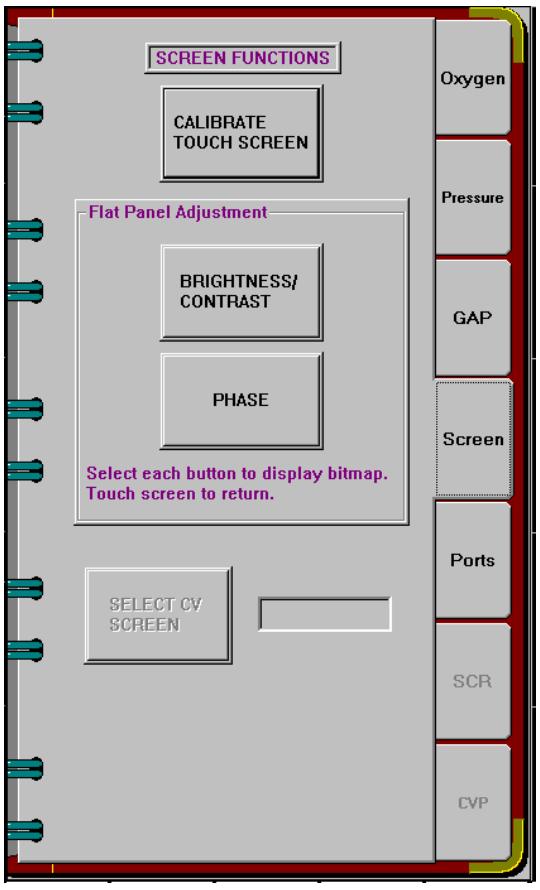


Figure 5-7C. Screen Functions Page

Brightness and Contrast Adjustments:

5.7A.6 Press the BRIGHTNESS/CONTRAST button on the Screen Functions page to display the gray-scale test pattern.

5.7A.7 Press the Function key (Figure 5-7A) to bring up the On Screen Display (OSD) (Figure 5-7B).

5.7A.8 Use the ▶ key to select Brightness, then press the Function key.

5.7A.9 Press the ◀ key (repeatedly) to step the brightness scale to zero, then press the Function key to enter that value.

5.7A.10 Use the ▶ key to select Contrast, then press the Function key.

5.7A.11 Use the ◀ or ▶ key to step the contrast scale to 32, then press the Function key to enter that value.

NOTE: For the following adjustments, your angle of view should be perpendicular to the center of the screen, and in normal ambient light.

5.7A.12 Select the Brightness function on the OSD, and press the Function key.

5.7A.13 Use the ▶ key to increase the brightness until the second and third shaded bars in the lower left portion of the screen are barely distinguishable. Press the Function key to enter that setting.

5.7A.14 Select the Contrast function on the OSD, and press the Function key.

5.7A.15 Increase the contrast until the brightest two shades in the lower right portion of the screen are barely distinguishable from one another.

If necessary, return to the Brightness function and readjust brightness until the two darkest shades in the lower half of the screen are barely distinguishable. If you readjust brightness, contrast may need to be adjusted again.

5.7A.16 When the desired settings are achieved, select Remove OSD and press the Function key.

5.7A.17 Touch the NM6000 screen anywhere to return to the service monitors notebook.

Phase Adjustment:

5.7A.18 Press the PHASE button on the Screen Functions page to display the full screen text pattern.

NOTE: The following adjustment should be performed at normal room temperature in order to provide a stable image over the range of temperatures expected in normal use of the NM6000.

If the phase window is very small (0 - 5 counts), restore factory defaults and repeat the adjustment procedure.

5.7A.19 Press the Function key to bring up the OSD.

NOTE: The following line of text is displayed on the OSD under the icons: "Phase Adj ± # ". This is a readout of the temperature compensation circuit and is *not* the phase setting. See Figure 5-7B.

5.7A.20 Select Phase, then press the Function key.

Initially, the phase setting will reside somewhere in the range of 0 to 31. The shaded area in the chart shown in Figure 5-7D represents the scale length displayed on the phase adjustment screen of the OSD.

While observing the upper right area of the text screen:

5.7A.21 Use the ◀ key to decrease the phase adjustment until the characters show distortion or flicker, then back up one step.

If you did not go below zero and start down the scale again on the phase adjustment screen, record the setting.

If you went below zero and started down the scale again to obtain a setting, find that number to the left (counter-clockwise) of the shaded area in the outer row of the chart. Record its corresponding number in the inner row. For example, if your setting is 27, then record a -5.

5.7A.22 Use the ▶ key to increase the phase adjustment until the characters show distortion or flicker, then back down one step.

If you did not go above 31 on the phase adjustment scale, record the setting.

If you went above 31 and started up the scale again to obtain a setting, find that number to the right (clockwise) of the shaded area in the outer row of the chart. Record its corresponding number in the inner row. For example, if your setting is 3, then record a 35.

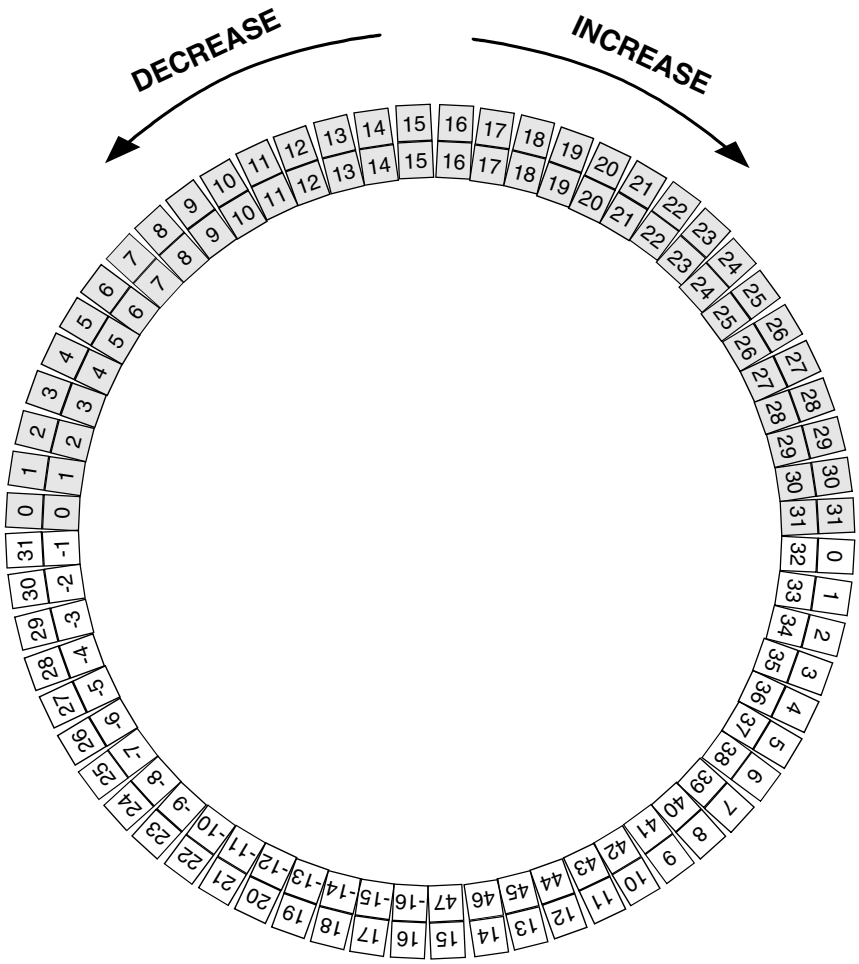


Figure 5-7D. Phase Adjustment Chart

5.7A.23 Find the algebraic mean between your recorded numbers; if the mean value is 5, 6 or 7, add 2 to the value. (Example: if the mean value is 6, then the entered value will be 8.) Set the phase adjustment to that value. Press the Function key to enter the value.

Video Position Adjustment:

5.7A.24 Use the ◀ key to select VIDEO POSITION ADJUST, then press the Function key.

5.7A.25 Use the ▶, ◀, ▼, ▲ keys to align the video image until all information in the title bar, selection boxes at the top and bottom, and white border lines are visible on both sides of the screen.

5.7A.26 Select Remove OSD and press the Function key.

5.7A.27 Touch the NM6000 screen anywhere to return to the service monitors notebook.

5.8 Touch Screen Calibration

Note: Touch screen calibration is needed whenever a monitor is replaced, or when picture size or centering is adjusted. This ensures correct registration of the touch screen coordinates with the picture.

NOTE: Do not calibrate touch screen from Primary Service Screen or cursor will not appear.

5.8.1 Enter the service mode (ref. Section 2) and touch the Service Monitors softkey to display the service monitors notebook.

5.8.2 Touch the Screen tab to display the touch screen calibration Service Screen page.

5.8.3 Press the CALIBRATE TOUCH SCREEN key to display the dialog box shown in Figure 5-8.

5.8.4 Select Mode 5 - Drag, and the two boxes at the bottom of the dialog box should be un-checked.

5.8.5 Press the Calibrate >> key in the dialog box.

5.8.6 Three touchpoints will appear on the screen (upper left, lower right, and upper right). Touch each one as it appears on the screen.

NOTE: If the cursor does not appear or cannot be moved properly, proceed to the Advanced Touch Screen Calibration procedure.

5.8.7 Test the operation of the cursor by moving your finger around the screen surface. The cursor should follow.

5.8.8 Press the OK key in the dialog box.

5.8.9 Touch the Exit Service key to return the monitor to normal operation.

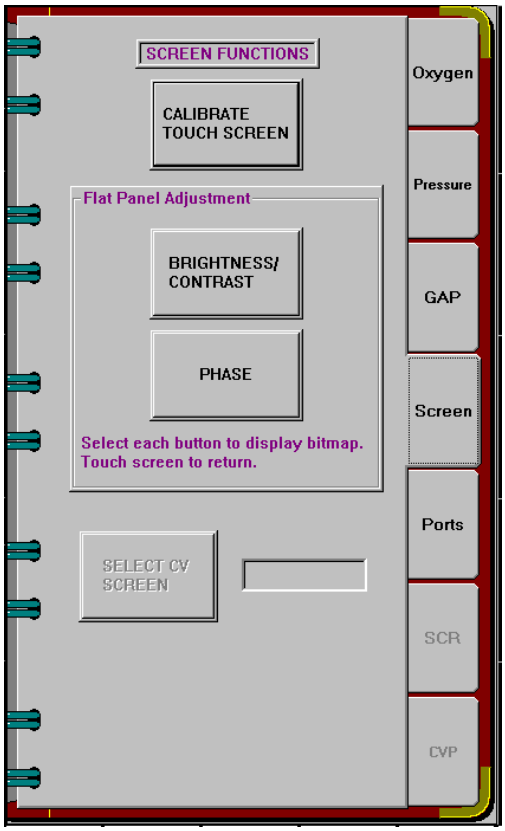
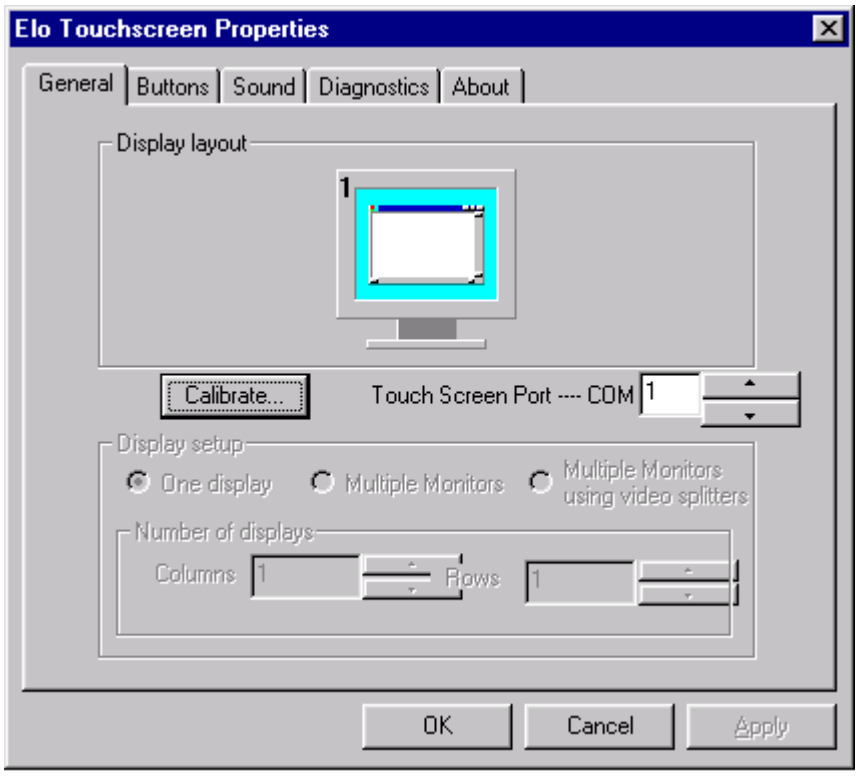


Figure 5-8. Touch Screen Calibration

Dialog Box ⬇



5.8A Advanced Touch Screen Calibration

NOTE: The advanced touch screen calibration procedure is needed when calibration is not possible under the usual procedure described earlier.

5.8A.1 Connect a keyboard (P/N 4115133) to the DIN connector on the underside of the NM6000 cockpit area as shown in Figure 5-8A. The following operations are performed on this keyboard unless otherwise noted.

5.8A.2 Unlock the keyboard by pressing CTRL-F9 and then ALT-F9.

5.8A.3 To display the Start menu press CTRL-ESC or Windows key, then press S for Settings, then press C for Control Panel.

5.8A.4 With the Control Panel window displayed, use the cursor down and the other cursor keys to highlight the selection for Touchscreen. Press ENTER to display the touchscreen calibration window.

5.8A.5 Verify that the Drag button is selected, and the two boxes at the bottom of the dialog box are un-checked. If they are not, use the cursor up and down keys and press ENTER to make the desired selection. After each selection is made you will return to the Control Panel screen. Press ENTER to return to the Touchscreen calibration menu.

5.8A.6 On the keyboard, use the arrow keys to highlight the Calibrate button; then press ENTER to run the calibration program.

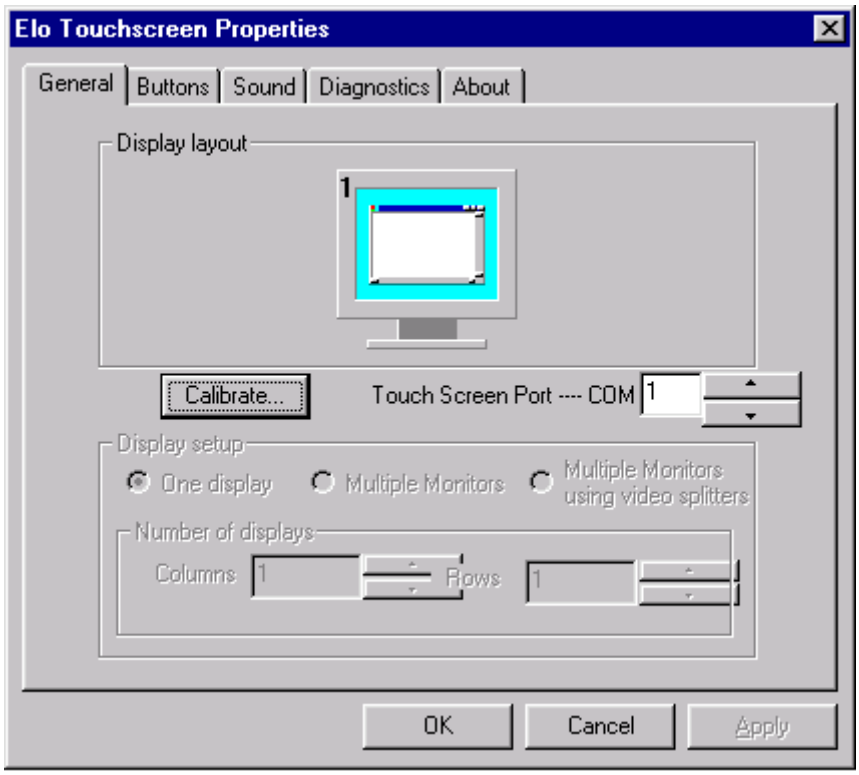
5.8A.7 Three touchpoints will appear on the screen (upper left, lower right, and upper right). Touch each one as it appears on the screen.

If the alarm window covers the upper left touchpoint, touch the upper left corner of the screen (make a guess as to the first touchpoint position), then touch the other two points. On the NM6000 screen, press YES and OK. Move the alarm window to the bottom left of the screen and repeat the touchpoint calibration.

5.8A.8 Close the touch screen calibration window by pressing OK on the NM6000 screen.

5.8A.9 Touch the NM6000 screen anywhere within the control panel window, then press ALT F4 on the keyboard.

5.8A.10 Disconnect the keyboard from the NM6000.



Dialog Box ↑

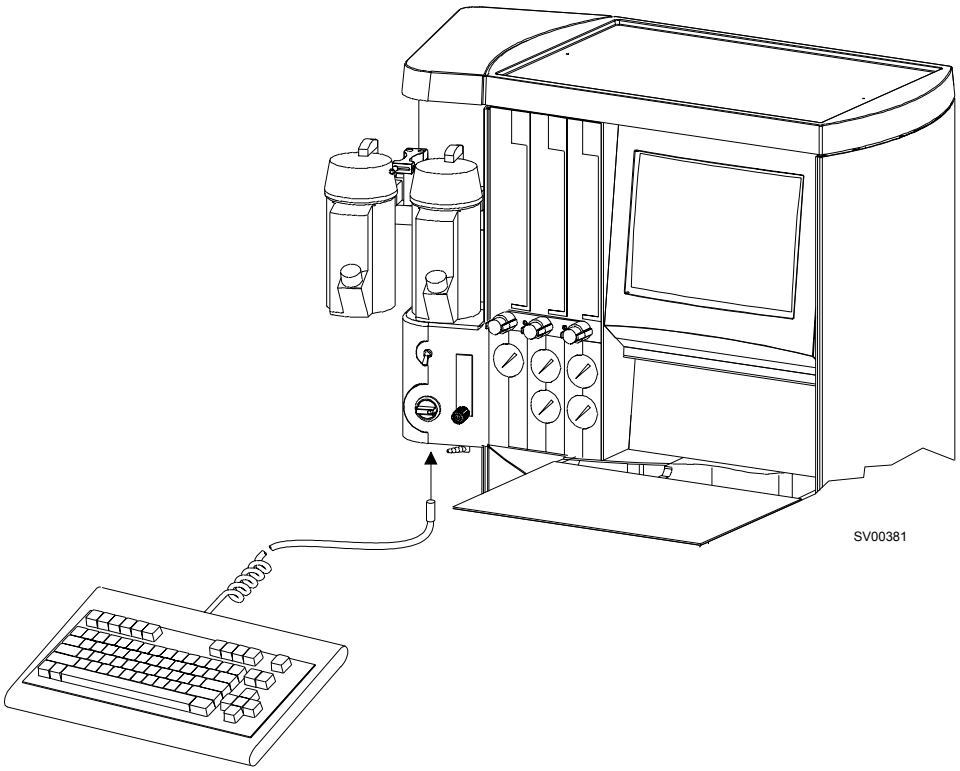


Figure 5-8A. Advanced Touch Screen Calibration

5.9 Ventilator Supply Pressure Adjustment (1.5 bar)

NOTE: Breathing system diaphragm integrity at location Y2 should be verified before making this adjustment. Refer to Section 4.14.

5.9.1 Turn the System Power switch to STANDBY.

5.9.2 Close the cylinder valves. Remove the cylinders from their yokes. (Leave the pipeline supplies connected.)

5.9.3 Remove the rear panel below the yokes.

5.9.4 Disconnect the tube at the bottom of the ventilator O_2 supply regulator (see Figure 5-9.) and connect a pressure meter to the hose barb on the regulator. Contact DrägerService Technical Support for test equipment configuration.

5.9.5 Turn the System Power switch to ON.

5.9.6 Adjust the regulator knob to achieve a pressure of 1.5 bar. (21.8 psi)

5.9.7 Turn the System Power switch to STANDBY.

5.9.8 Disconnect the pressure meter and reconnect the original tube to the hose barb on the restrictor.

5.9.9 Reinstall the back panel on the machine (unless you are making further adjustments in this area).

5.9.10 Reinstall the cylinders in their yokes.

5.9.11 Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole dirrectly above the power cord socket as shown in Figure 5-9A.

5.9.12 Perform the calibrations and operating mode verifications. Refer to Section 6.17 Divan service mode and 6.18 Divan operating mode.

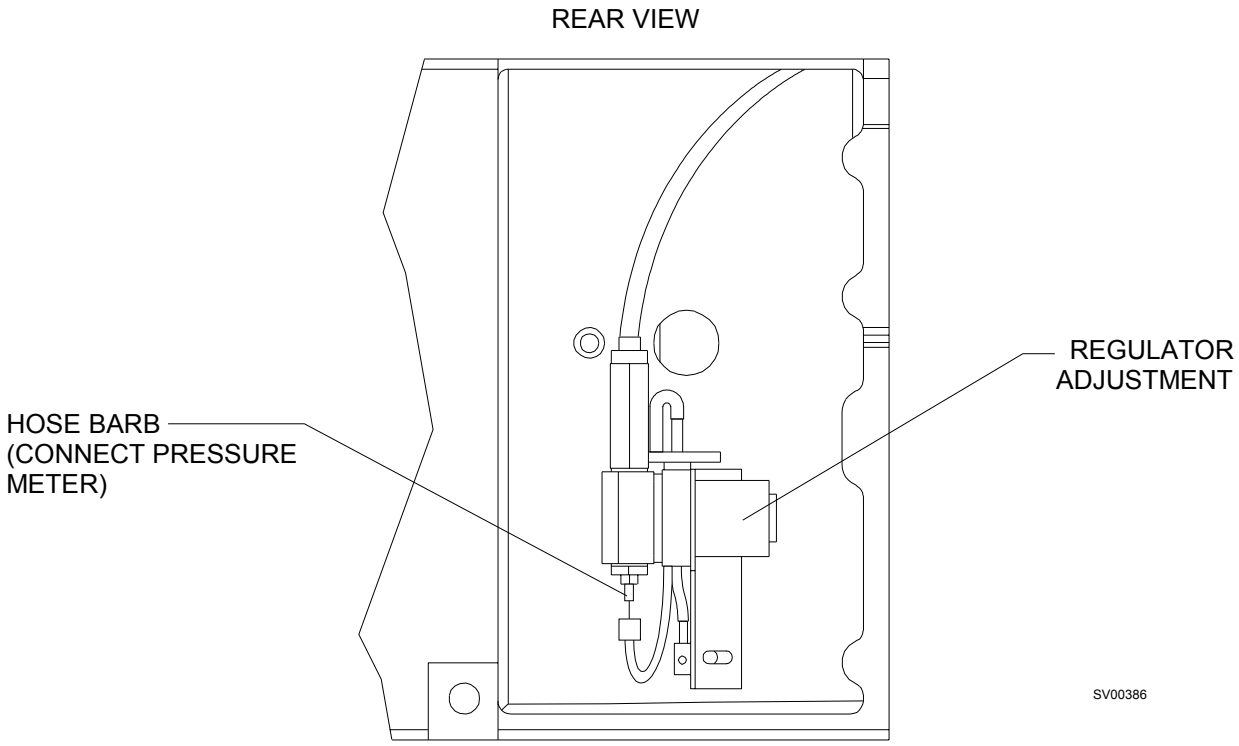


Figure 5-9. Supply Pressure Regulator Adjustment

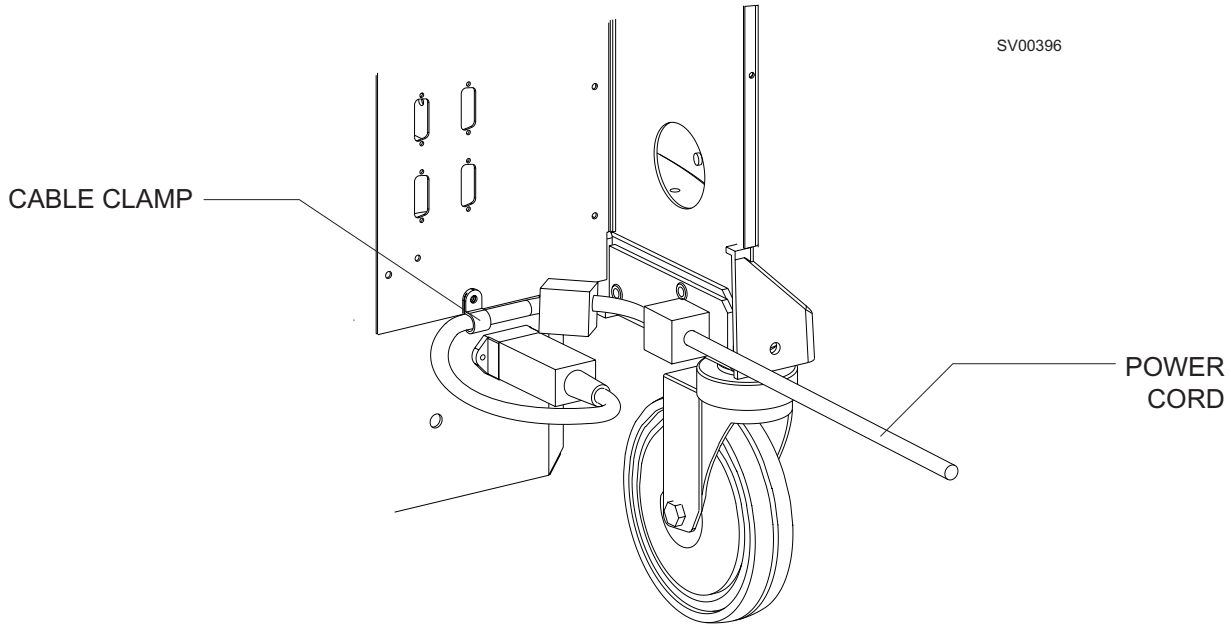


Figure 5-9A. Power Cord Routing

5.10 Ventilator Supply Flow Adjustment (2L/min.)

NOTE: Breathing system diaphragm integrity at location Y2 should be verified before making this adjustment. Refer to Section 4.14.

NOTE: the ventilator supply pressure (1.5 bar) should be verified before making this adjustment. Refer to Section 5.9.

5.10.1 Turn the System Power switch to STANDBY.

5.10.2 Close the cylinder valves. Remove the cylinders from their yokes. (Leave the pipeline supplies connected.)

5.10.3 Remove the rear panel below the yokes.

5.10.4 Disconnect the tube from the variable restrictor at the bottom of the ventilator O_2 supply regulator assembly. See Figure 5-10.

5.10.5 Connect a test flowmeter to the hose barb on the restrictor. Contact DrägerService Technical Support for test equipment configuration.

5.10.6 Remove the breathing system (for front access to the flow adjustment).

5.10.7 Turn the System Power switch to ON.

5.10.8 Adjust the restrictor to achieve a flow rate of 2 L/min. (You will need to remove a hole plug on the front of the machine for access to the flow adjustment as shown in the illustration.)

5.10.9 Turn the System Power switch to STANDBY.

5.10.10 Reinstall the hole plug on the front of the machine, and reinstall the breathing system.

5.10.11 Disconnect the test flowmeter and reconnect the original tube to the hose barb on the restrictor.

5.10.12 Reinstall the back panel on the machine.

5.10.13 Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole dirrectly above the power cord socket as shown in Figure 5-9A.

5.10.14 Reinstall the cylinders in their yokes.

5.10.15 Perform the calibrations and operating mode verifications. Refer to Section 6.17 Divan service mode and 6.18 Divan operating mode.

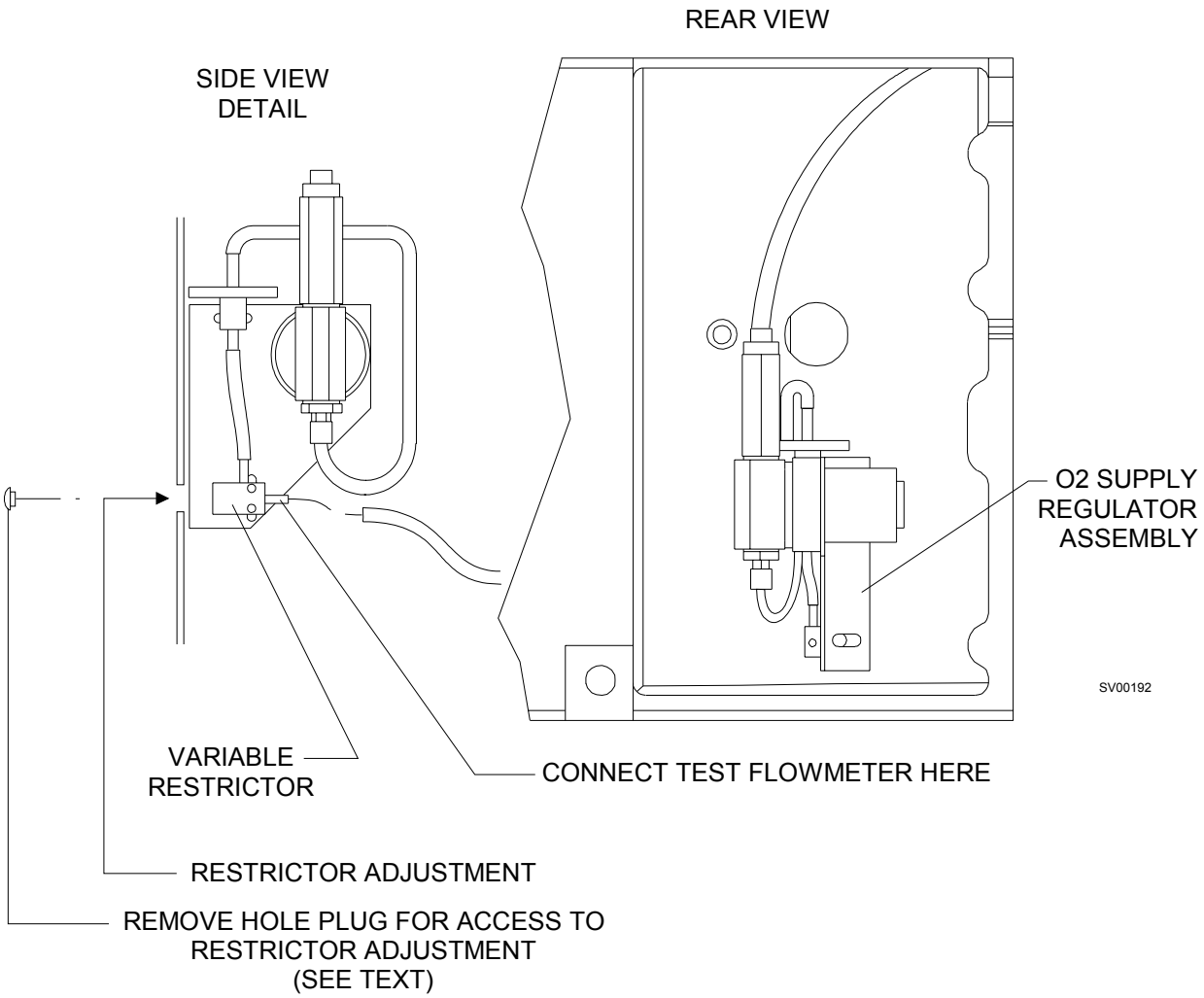


Figure 5-10. Ventilator Supply Flow Adjustment

5.11 Ventilator Control Pressure Adjustment (87 mbar)

NOTE: Breathing system diaphragm integrity at location Y2 should be verified before making this adjustment. Refer to Section 4.14.

NOTE: The vent supply pressure (1.5 bar) and ventilator supply flow adjustments should be verified before making this adjustment. refer to Sections 5.9 and 5.10.)

5.11.1 Turn the System Power switch to STANDBY.

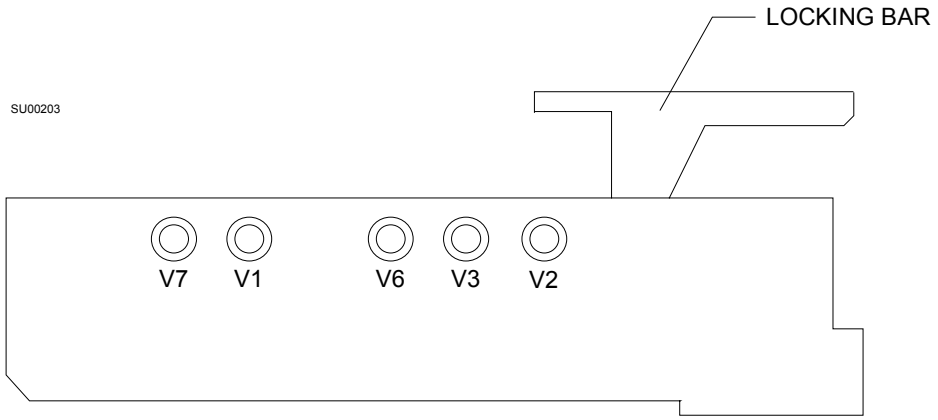
5.11.2 Remove the front bumper and front bezel from the Divan ventilator chassis. This procedure is outlined under **Ventilator Electronics Assembly - Battery Replacement** in Section 4. Do not disconnect the ribbon cable.

5.11.3 Temporarily remove the breathing system.

5.11.4 Turn the System Power switch to ON, and place the Divan ventilator in Service Mode.

5.11.5 Occlude pneumatic interface V2.

5.11.6 Hold a test pressure gauge to pneumatic interface V7. Use P/N 4115038 (PDM to patient suction adapter) w/silicon tube removed to connect V7 to the PDM.



BREATHING SYSTEM PNEUMATIC INTERFACE
(VIEW FROM LEFT SIDE WITH BREATHING SYSTEM REMOVED)

5.11.7 Loosen the lock nut and adjust the 87 mbar safety valve (see Figure 5-11.) to achieve a pressure of 67 mm Hg (91 cm H_2O) on the test gauge. Tighten the lock nut.

5.11.8 Turn the System Power switch to STANDBY.

5.11.9 Reinstall the breathing system.

5.11.10 Reassemble the Divan ventilator front bezel, bar and bumper.

5.11.11 Perform the calibrations and operating mode verifications. Refer to Section 6.17 Divan service mode and 6.18 Divan operating mode.

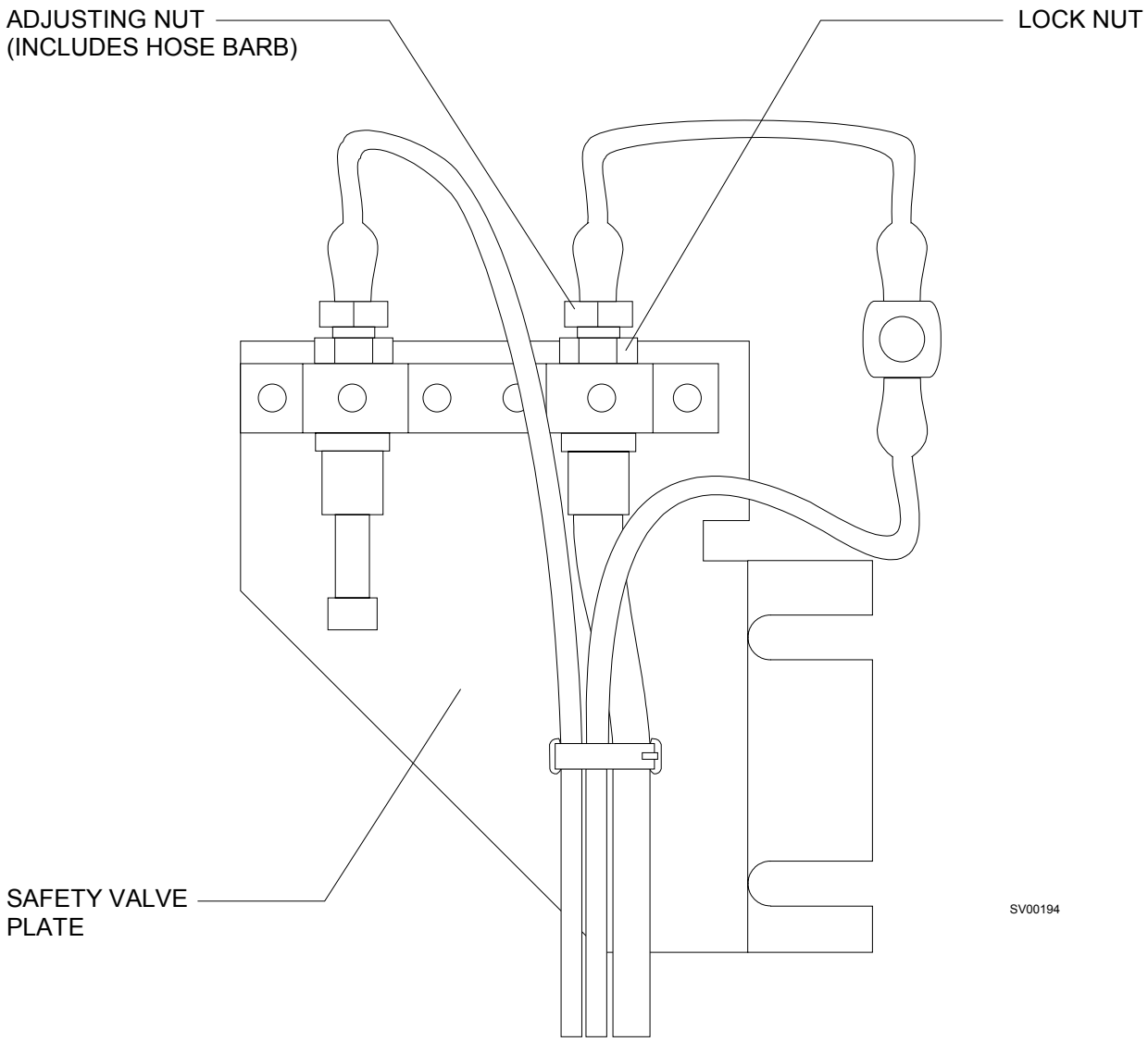


Figure 5-11. Ventilator Control Pressure Adjustment.

5.12 Breathing System Leveling Adjustment

The breathing system must be level (top surface parallel to back edge of ventilator chassis). The left side of the breathing system (facing the front of the machine) rests on two pins that project from the ventilator chassis. Each pin is fixed to an eccentric mount that allows the left side of the breathing system to be raised or lowered. A detail of the eccentric mount is shown in Figure 5-12.

The locknut for the rear mount can be reached through the back of the machine. Access to the lock nut for the front mount requires removal of the Divan front panel.

5.12.1 Turn the System Power Switch to STANDBY.

5.12.2 Disconnect all hoses from the breathing system.

5.12.3 Open the hinged top of the ventilator.

5.12.4 Turn the breathing system locking bar (¼ turn CCW) to unlock the breathing system.

5.12.5 Grasp the breathing system handle and lift the unit from the machine

5.12.6 At each pin, loosen the eccentric mounting lock nut while holding the pin in position with a hex wrench inserted in the end of the pin. Turn the pin until it is at the desired position, and tighten the lock nut.

5.12.7 Reinstall the breathing system and ensure that it seats properly on the pins. Repeat the previous step until the breathing system seats properly when installed.

5.12.8 Lock the breathing system in place and close the top of the ventilator.

5.12.9 Reconnect all hoses that were previously disconnected from the breathing system.

5.12.10 Turn the System Power switch to ON and observe the ventilator self test routine - verify that there are no leaks in the system.

5.12.11 Ensure that the breathing system heater is activated when the breathing system is put into place.

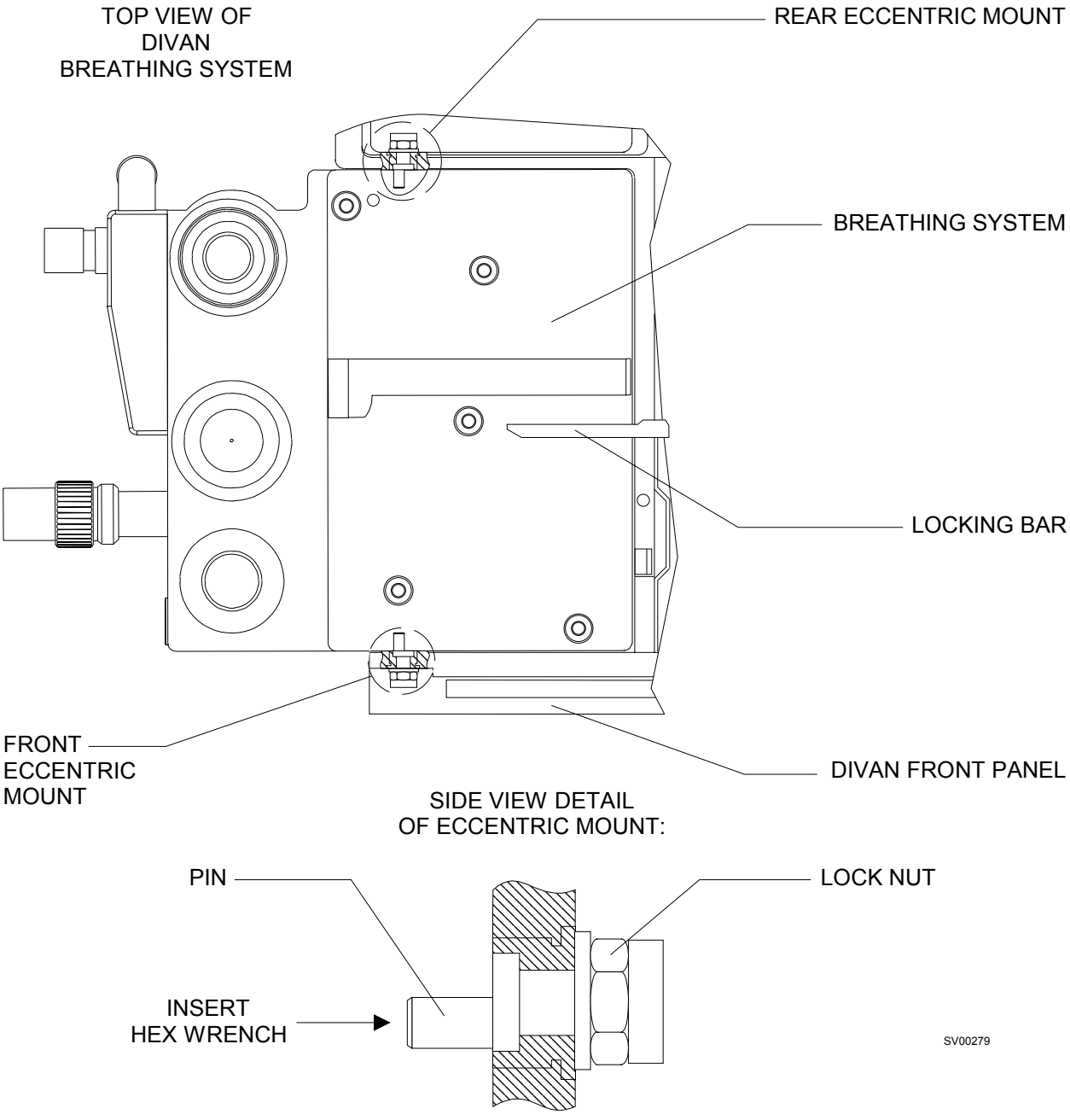


Figure 5-12. Breathing System Leveling Adjustment

5.13 Bag Pole Friction Adjustment

The bag pole spring pin friction adjustment screw is located at the back of the bumper as shown in Figure 5-13.

Using a flat blade screwdriver, turn the screw in (clockwise) until it bottoms, then back it out ⅛ of a turn.

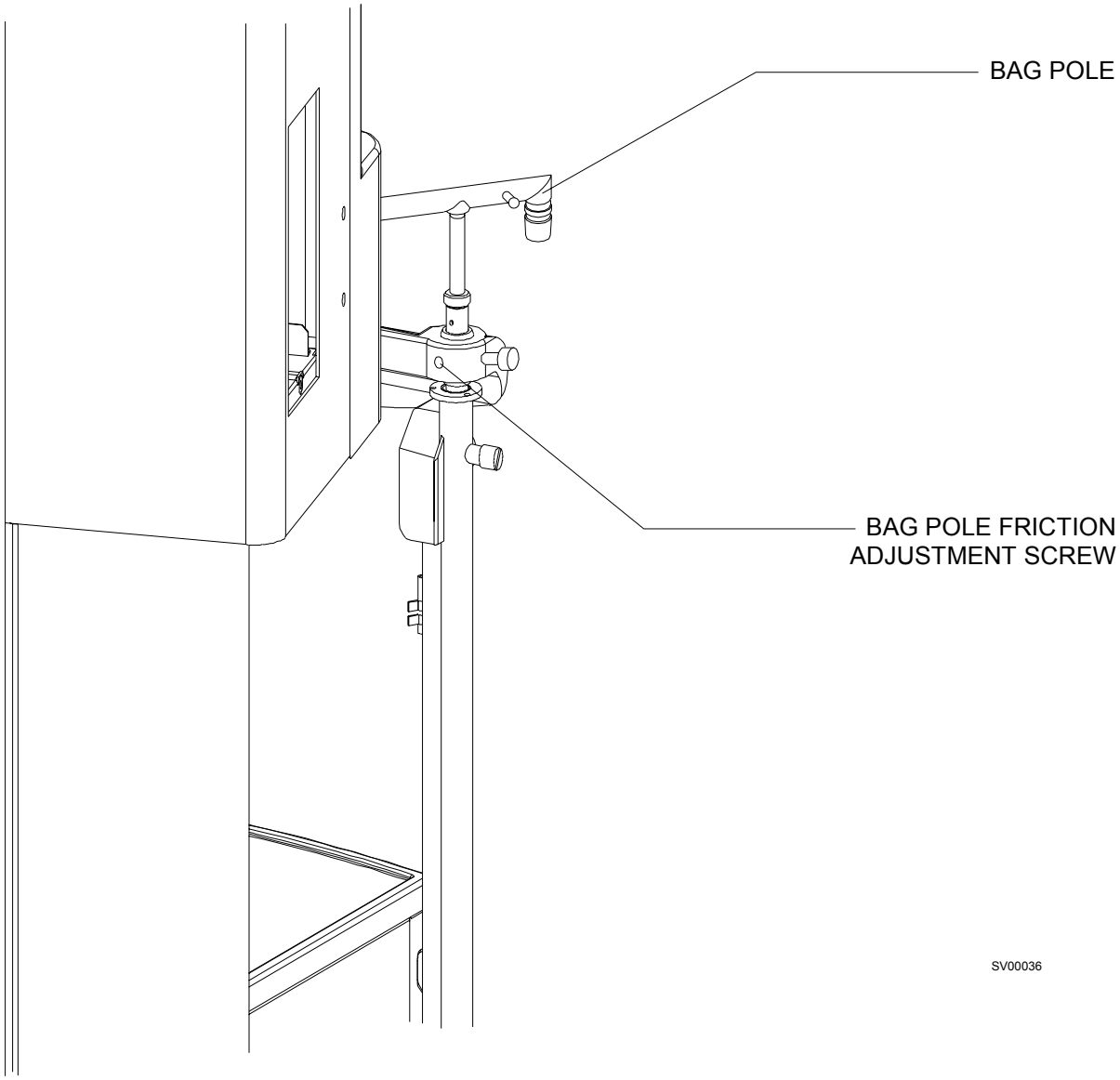


Figure 5-13. Bag Pole Friction Adjustment Screw

5.14 Right Vaporizer Vertical Adjustment

This procedure applies only to machines of serial numbers 10188 and later. Refer to the adjustment procedure in Section 7 for machines within the serial number range of 10000 thru 10187.

This procedure outlines the steps needed to ensure correct exclusion system operation in cases where there is difficulty in engaging the right (viewed from the front) vaporizer.

5.14.1 Turn the System Power switch to STANDBY.

5.14.2 Disconnect the semi-permeable tube at the water trap.

5.14.3 Loosen the captive mounting screw on the agent analyzer Pod and remove the assembly from the machine.

5.14.4 Disconnect the Vitalbus cable and the exhaust line at the back of the agent analyzer Pod.

5.14.5 Locate the vaporizer adjustment jack screw inside the cockpit weldment. See Figure 5-14.

5.14.6 Loosen the set screw several turns and apply purple Loctite (#222) to the threads. Re-tighten the set screw until contact is made with the cockpit panel.

5.14.7 Carefully adjust the set screw clockwise until proper engagement into the right mounted vaporizer is achieved.

5.14.8 Test the exclusion system for proper operation.

5.14.9 Reconnect the Vitalbus cable and the exhaust line at the back of the analyzer.

5.14.10 Slide the analyzer into the machine and secure it with its captive mounting screw.

5.14.11 Reconnect the semi-permeable tube to the water trap.

5.14.12 Perform the PMC Procedure given in Section 6.

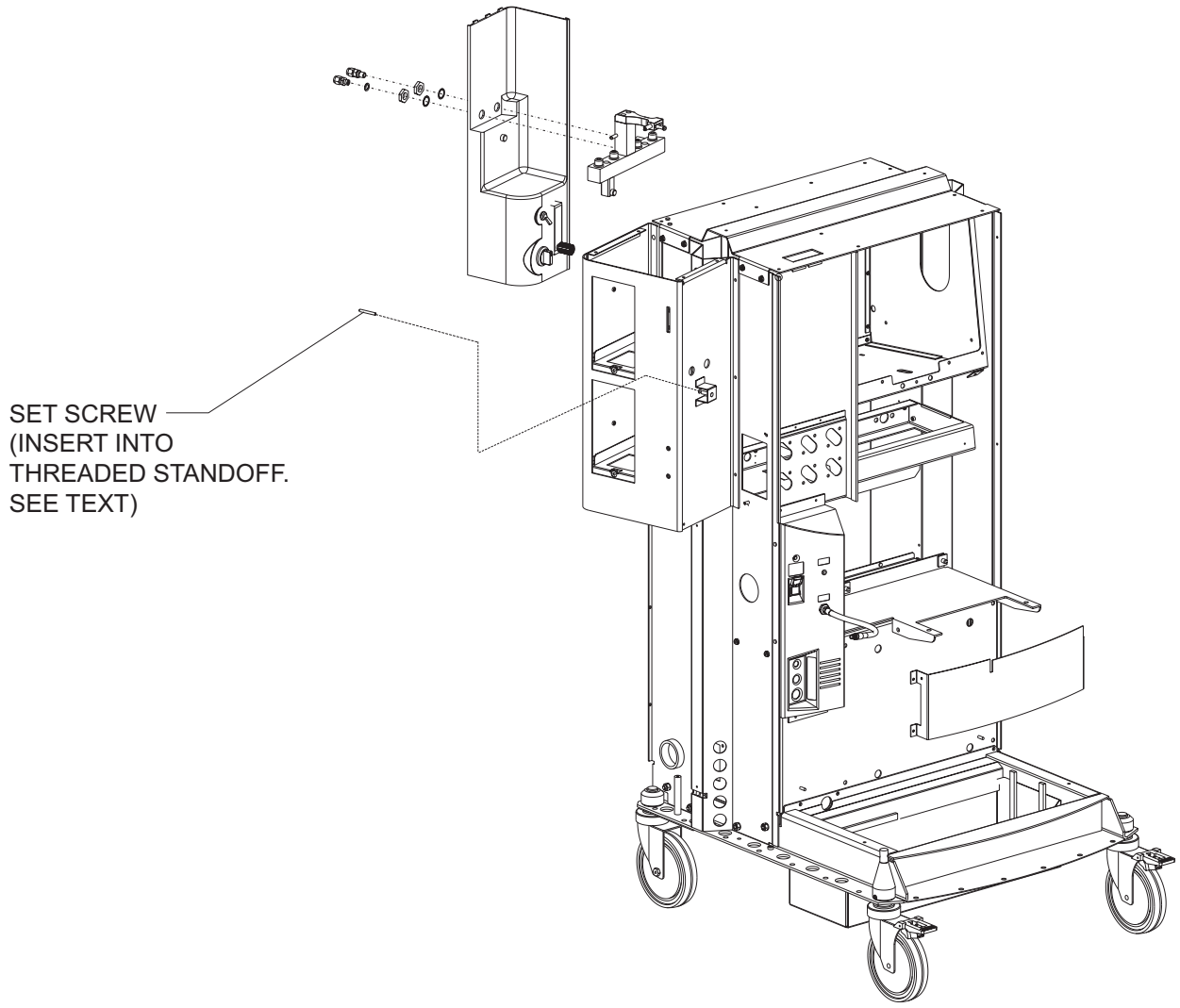


Figure 5-14. Vaporizer Set Screw Adjustment

5.15 System Electrical Switch Adjustment

5.15.1 Turn System Power switch to STANDBY.

5.15.2 Disconnect AC power from the machine, and disable all circuit breakers at the rear of the power supply.

5.15.3 Remove the bottom panel from the cockpit area.

5.15.4 Turn System Power switch to ON.

5.15.5 Loosen the switch mount bracket screws (Figure 5-15. rear view); move the bracket toward the main switch and tighten the screws.

5.15.6 Loosen the lever switch mounting screws (Figure 5-16. top view) and move the switch in the direction of the arrow as far as it will go.

5.15.7 Partially tighten switch mount screw **A**.

5.15.8 With screw **A** as a pivot, move the switch from side to side in an arc about screw **B** to determine a mid-point, and set the switch at the mid-point.

5.15.9 Tighten screws **A** and **B**.

5.15.10 Adjust the flat of the paddle until it is parallel to the switch lever.

5.15.11 Hold the switch lever away from the switch body, and turn the main switch from ON to STANDBY. If the paddle engages the lever at the end edge or passes under the lever, move the switch closer to the bracket screws.

5.15.12 Using a 5/64 allen wrench in the switch housing access hole, readjust the paddle to ensure correct switch actuation and overtravel. The paddle should be turned in a counter-clockwise direction only, and no more than ¼ turn from its setup position. Retest the previous step for proper operation.

5.15.13 Reinstall the cockpit area bottom panel.

5.15.14 Restore AC power to the machine, and enable all circuit breakers.

5.15.15 Verify proper operation of the auxiliary oxygen flowmeter (6.10.4)

5.15.16 Verify proper operation of the main switch at STANDBY. Grasp the switch and move it laterally left and right until satisfied with its performance.

5.15.17 Turn the mainswitch to ON and verify that the system electronics energize.

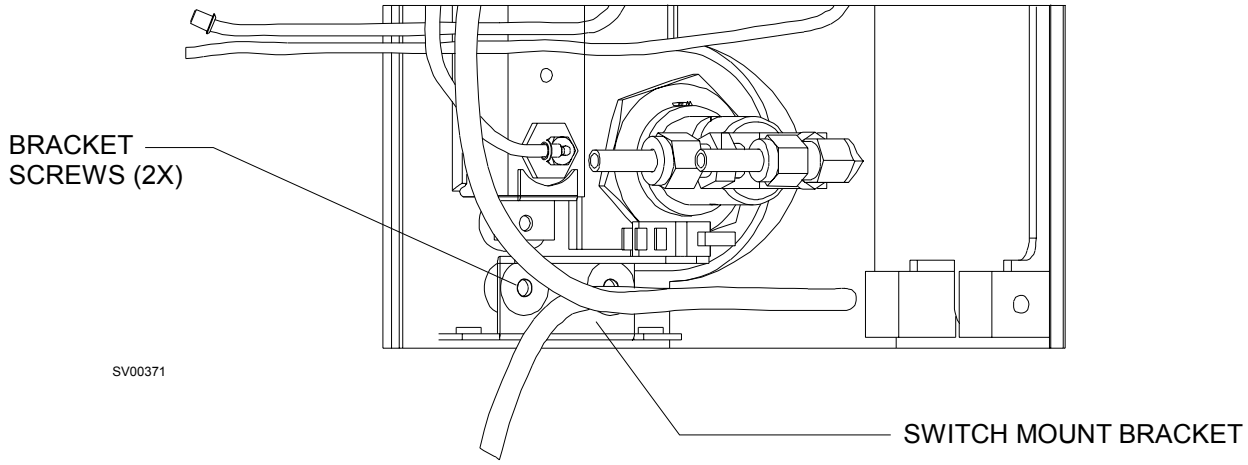


Figure 5-15. Rear View of Main Switch Area

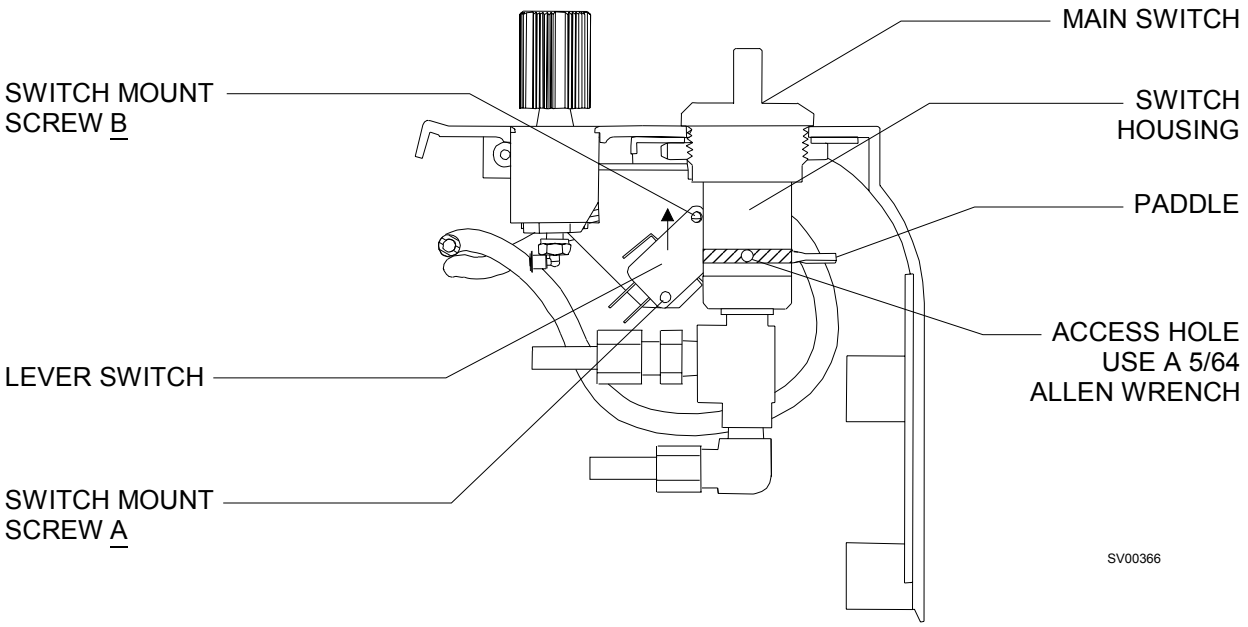


Figure 5-16. Top View of Main Switch Area

5.16 Local Time Zone Adjustment

This procedure provides instructions required to make automatic adjustments in the Narkomed 6000 settings for local time zone observations.

5.16.1 Connect a keyboard (P/N 4115133) to the DIN connector on the underside of the NM6000 cockpit area as shown in Figure 5-17. The following operations are performed on this keyboard unless otherwise noted.

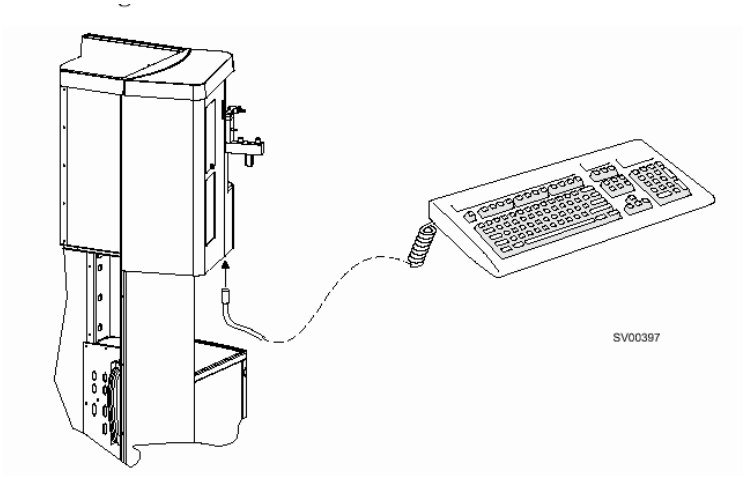


Figure 5-17. Keyboard Connector Location

5.16.2 On the keyboard connected to the Narkomed 6000, press the ESC key several times. The next sequence of commands must be performed quickly and in this exact order.

5.16.2.1 Press and hold the CTRL key, press the F9 key, release the CTRL key, release the F9 key.

5.16.2.2 Press and hold the ALT key, press the F9 key, release the ALT key, release the F9 key.

5.16.3 To display the Start menu, press CTRL-ESC or the Windows key, then press S for Settings, then press C for Control Panel. Note: if the Start key can not be activated, repeat the keyboard commands given in Step 5.16.2.

5.16.4 With the Control Panel window displayed, use the cursor down and the other cursor keys to highlight the selection for Date/Time. Press ENTER to display the Date/Time properties window. See Figure 5-18.

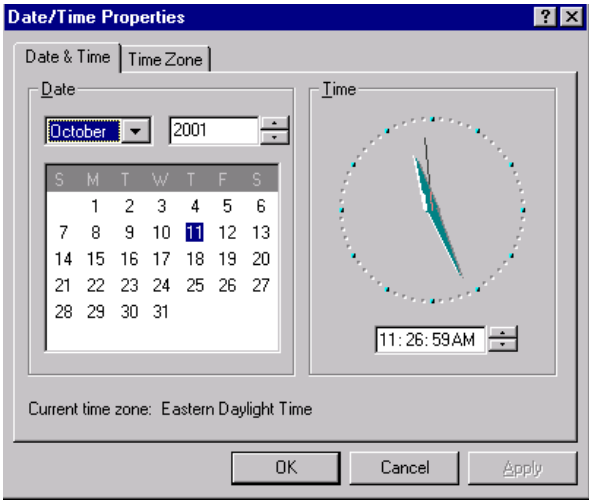


Figure 5-18. Date/Time Properties Window

5.16.5 Select the Time Zone tab. See Figure 5-19.

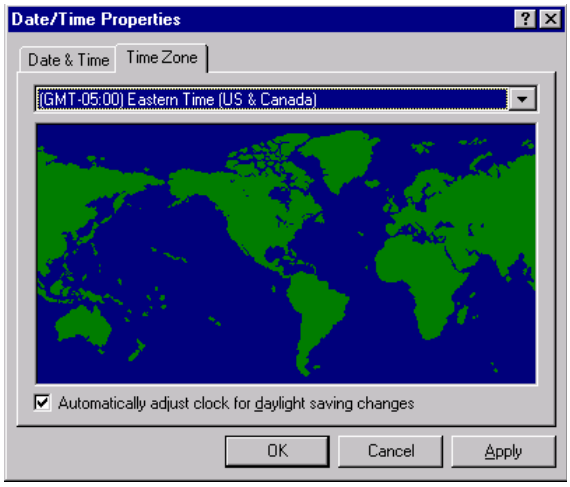


Figure 5-19. Time Zone Tab

5.16.6 Using the pull-down arrow, select the Time Zone appropriate for your location. Refer to Figure 5-20.

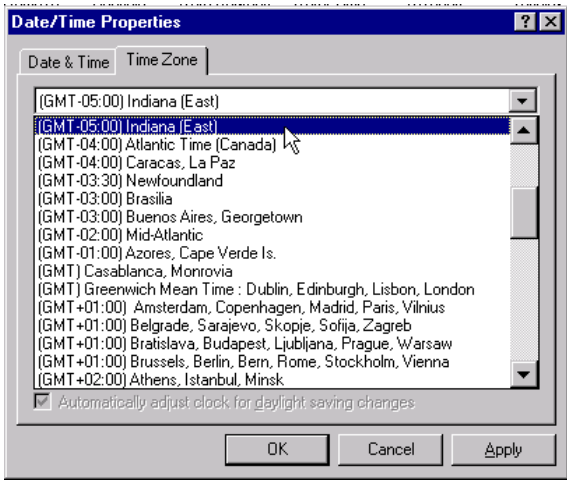


Figure 5-20. Time Zone Drop Down

5.16.7 Select the OK button at the bottom of the dialog box to complete the adjustment.

5.17 Narkomed 6000 Alarm Sound Volume Adjustment

This procedure provides the instructions required to reduce the maximum alarm annunciation sound volume level at the request of the customer. This is accomplished by adjusting the Windows NT master volume from 100% to 50%.

5.17.1 Power-on the NM6000. Press the Divan's Standby key, then wait for the NM6000 to complete its start-up.

5.17.2 Connect a keyboard (P/N 4115133) to the DIN connector on the underside of the NM6000 cockpit area as shown in Figure 5-21. The following operations are performed on this keyboard unless otherwise noted.

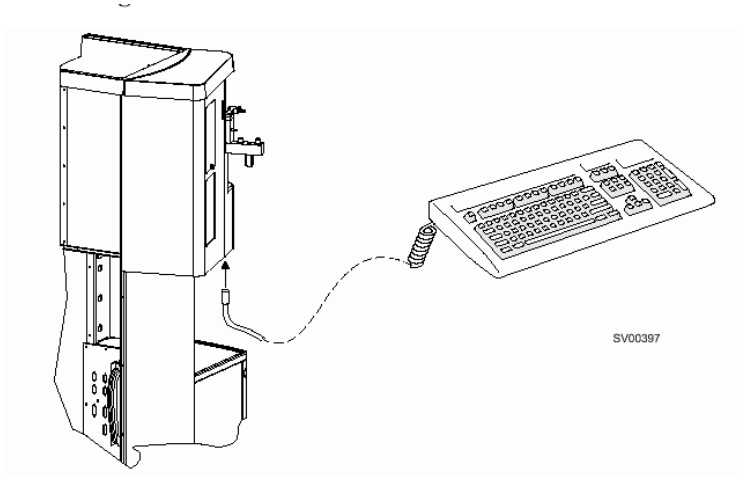


Figure 5-21. Keyboard Connector Location

5.17.3 On the keyboard connected to the Narkomed 6000, press the ESC key several times. The next sequence of commands must be performed quickly and in this exact order.

5.17.3.1 Press and hold the CTRL key, press the F9 key, release the CTRL key, release the F9 key.

5.17.3.2 Press and hold the ALT key, press the F9 key, release the ALT key, release the F9 key.

5.17.4 Press the CTRL-ALT-DEL keys to launch the Windows NT Security dialog. SeeFigure 5-22. Note: If the Windows NT Security dialog can not be activated, repeat the keyboard commands given in Step 5.17.3.

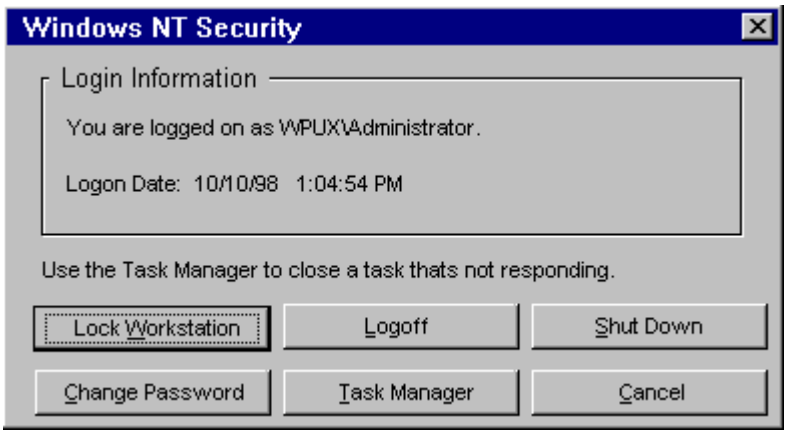


Figure 5-22. Windows NT Security Dialog

5.17.5 Touch the Task Manager button to launch the Windows NT Task Manager.

5.17.6 Touch the Applications tab page.

5.17.7 Using the cursor, select the SYSTEM 1 MANAGER application.

5.17.8 Touch the End Task button.

5.17.9 Touch the Processes tab page.

5.17.10 Touch screen at the GSPLUS.exe file.

5.17.11 Touch the End Processes button.

5.17.12 Touch Yes to end the task.

5.17.13 Type ALT-F4 to close the Windows NT Task Manager.

5.17.14 Press CTRL-ESC or the Windows key to display the Start menu, then use the keyboard arrow up keys to select RUN, then press Enter.

5.17.15 Type in 'sndvol32' then press Enter. Refer to Figure 5-23.

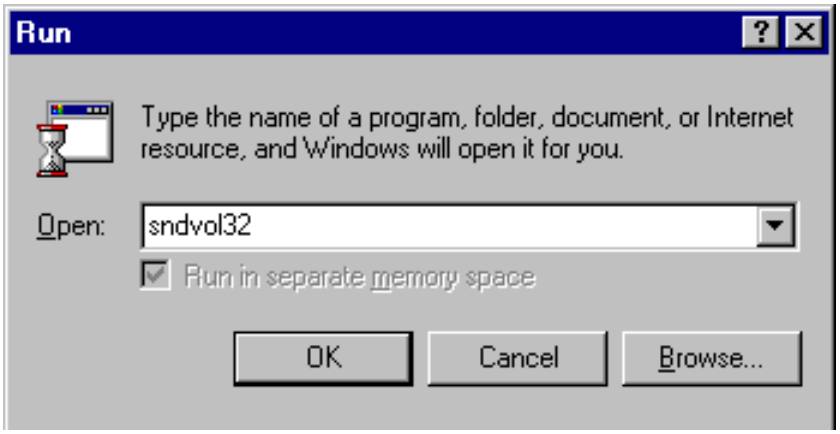


Figure 5-23. Windows NT 'Run' Box

5.17.16 Using the keyboard arrow keys, adjust the vertical slide bar on the Volume Control so that the center of the slide is at the center of the volume scale as shown in Figure 5-24.

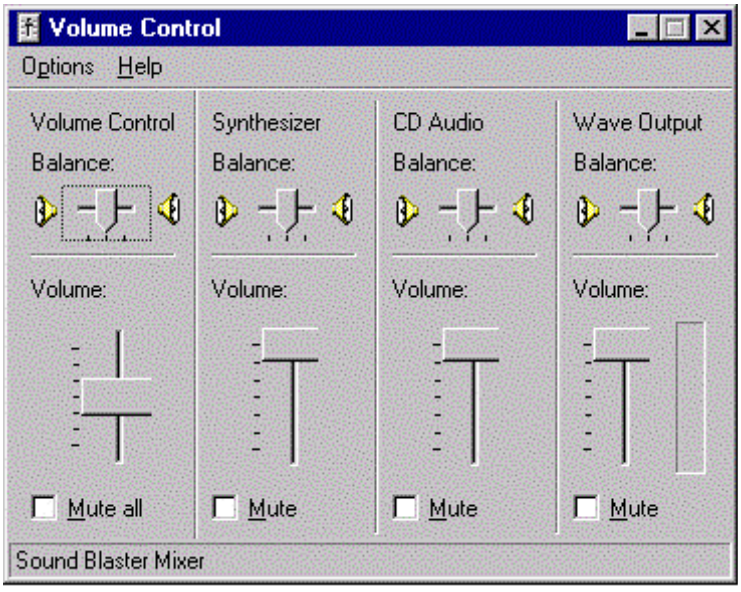


Figure 5-24. Volume Control Window

5.17.17 Type ALT-F4 to close the MasterOut/Volume Control window.

5.17.18 Press CTRL-ESC or the Windows key to display the Shutdown dialog, then select the Restart radio button and press OK. See Figure 5-25.

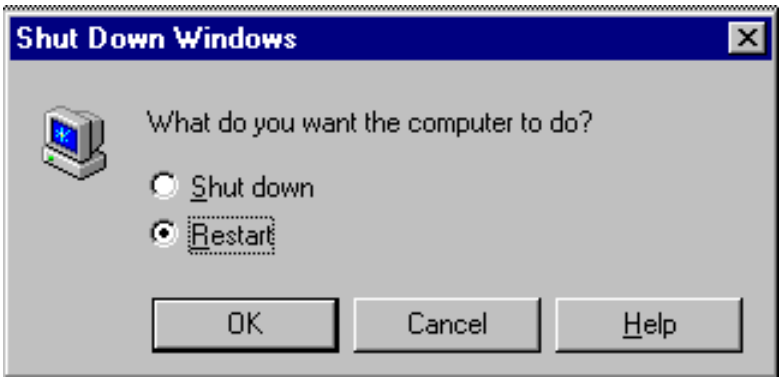


Figure 5-25. Shutdown Windows Dialog

5.17.19 Press the Divan's Standby key and wait for the NM6000 to complete its start-up.

5.17.20 Once the NM6000 is restarted, open the notebook by touching the softkey labeled SETUP and select the Volume tab. Refer to Figure 5-26.

5.17.21 Adjust the slider control to the maximum level.

5.17.22 Verify that the tone can be heard.

5.17.23 Verify that there are no speaker failures.

5.17.24 Adjust the slider to the minimum level.

5.17.25 Verify that the tone can be heard.

5.17.26 Verify that there are no speaker failures.

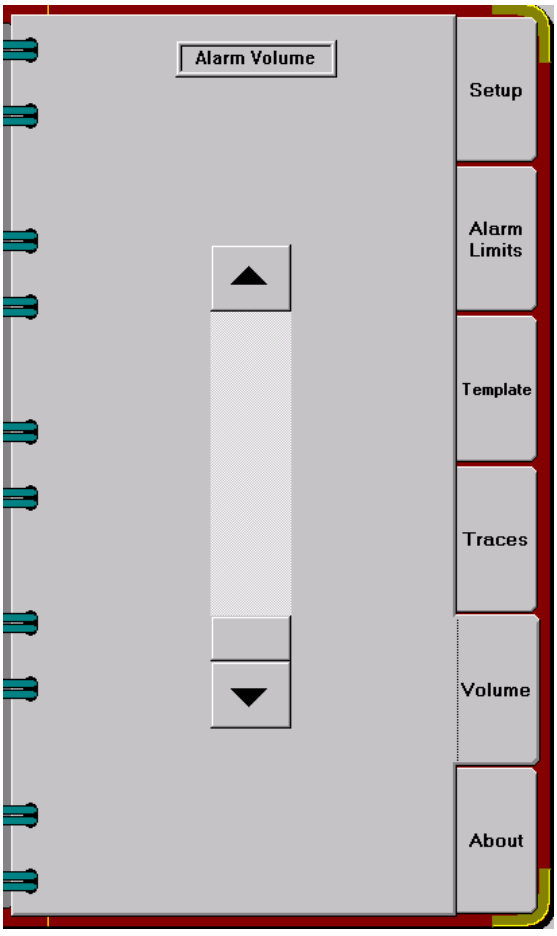


Figure 5-26. Volume Control Notebook Page

RETURN TO THIS MANUAL'S TABLE OF CONTENTS
RETURN TO CD-ROM TABLE OF CONTENTS

6.0 PMC PROCEDURE, NARKOMED 6000

The procedures in this section shall be performed in their entirety each time a component is removed, replaced, calibrated or adjusted, and during all scheduled Periodic Manufacturer's Certification (PMC) visits. A Narkomed 6000 PMC Checklist form, P/N 4115093, available from the DrägerService, shall be completed by the Technical Service Representative each time a PMC is performed. If the machine is equipped with an Integrated Patient Monitor (IPM) or strip chart recorder, an IPM and strip chart recorder checklist form, P/N 4116820, shall also be completed by the technician. The section numbers on the PMC checklist form are keyed to paragraph numbers in this manual. Steps in the procedure marked with (✓) require a response at the corresponding line on the checklist form.

Space is also provided on the PMC Checklist form to record the results of a vapor concentration test.

NOTE:

Test equipment listed below with an asterisk (*) requires calibration at a maximum interval of one year. Verify the dates on test equipment calibration labels. DO NOT USE any test equipment having an expired calibration date. Notify your supervisor immediately if any equipment is found to be out of calibration.

In the space provided at the bottom of the PMC checklist form, record the Model and ID number of all calibrated test equipment used. Also record the calibration due dates.

Base Machine Test Equipment Required:

NOTE: If the machine is equipped with an IPM and/or strip chart recorder, refer to Section 6A in this manual.

-- *Electrical Safety Analyzer (Biotek 501 Pro or equivalent)

-- *Test Pressure Gauge, P/N 4114807 or equivalent

-- *Flowmeter Test Stand (Capnomed), P/N S000081 or equiv. w/5% FS accuracy

-- *Test Minute Volume Meter, P/N 2212300 or equivalent

-- *Digital Pressure Manometer (SenSym PDM 200CD or equivalent)

-- *Riken Gas Indicator, Model 18H, or 1802D or equivalent

-- Stop Watch

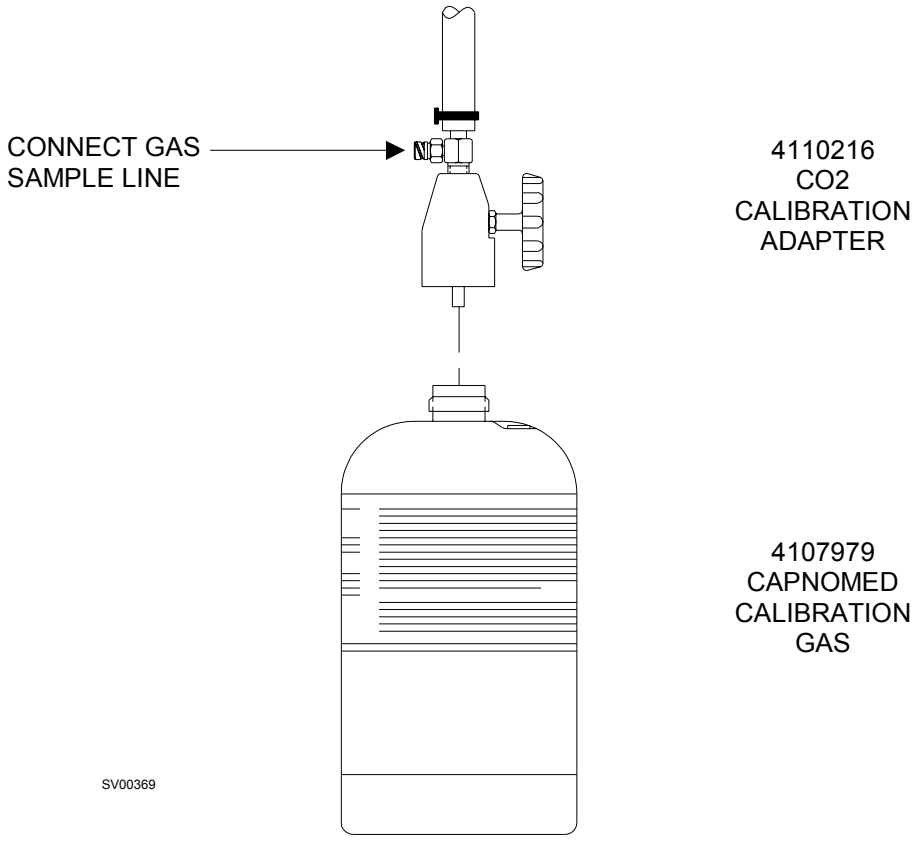
-- Test Lung, Siemens P/N 4115128

Base Machine Materials Required:

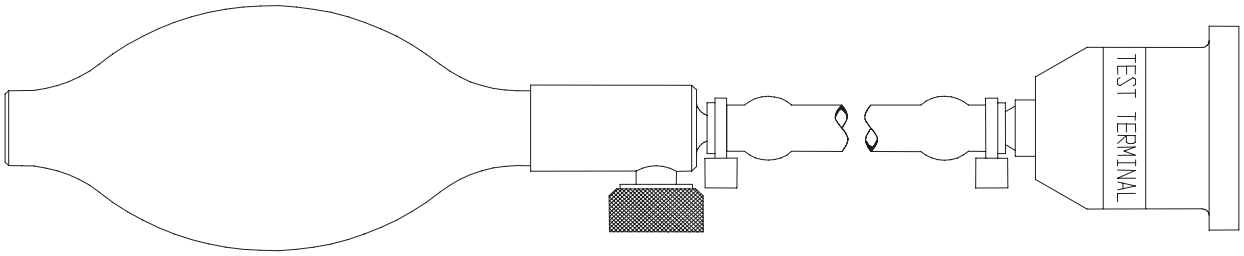
-- Rubber goods set: Y-piece, elbow, 2x 32" x 22mm hoses, 2L bag P/N 1101071
-- Tube, corrugated, 22 mm x 12 in. long, P/N 9995112
-- Adapter assembly, test terminal, P/N 4104389 or equivalent: two are required
-- Adapter, CO_2 calibration, P/N 4110216
-- Adapter, fresh gas leak test P/N 4115041
-- Adapter, GAP return P/N 4115040
-- Adapter, suction pipeline P/N 4115039
-- Molykote 55M grease P/N 4115127
-- Cylinder, Capnomed calibration gas P/N 4107979
-- Adapter, volumeter/freshgas hose P/N 4115042
-- Adapter, PDM to patient suction P/N 4115038
-- Adapter, connectors 33mm x 22mm P/N 4115087
-- Qdisc, male fresh gas P/N M31581
-- Adapter, airway w/luer fitting P/N 4108104
-- Tube, PVC sample line P/N 4108103
-- Breathing sys leak test device P/N S010159
-- Adapter, PDM to monitor P/N 4115043
-- Fitting, Luer lock (F) x ⅛ MPT P/N 4110709
-- Pipet, disposable P/N 4115090
-- Screwdriver D 1,2 x 8 x 150 Din 5265 P/N 7900864
-- Silicon Rubber, Walker Elastosil, E41g, 90 mL P/N 1202537
-- Static Field Servive Kit, P/N S000095

-- Kit, PMS NM6000, 6 month P/N 4115074-001
-- Kit, PMS NM6000, 1 year P/N 4115074-002
-- Kit, PMS NM6000, 2 year P/N 4115074-003
-- Kit, PMS NM6000, 3 year P/N 4115074-004

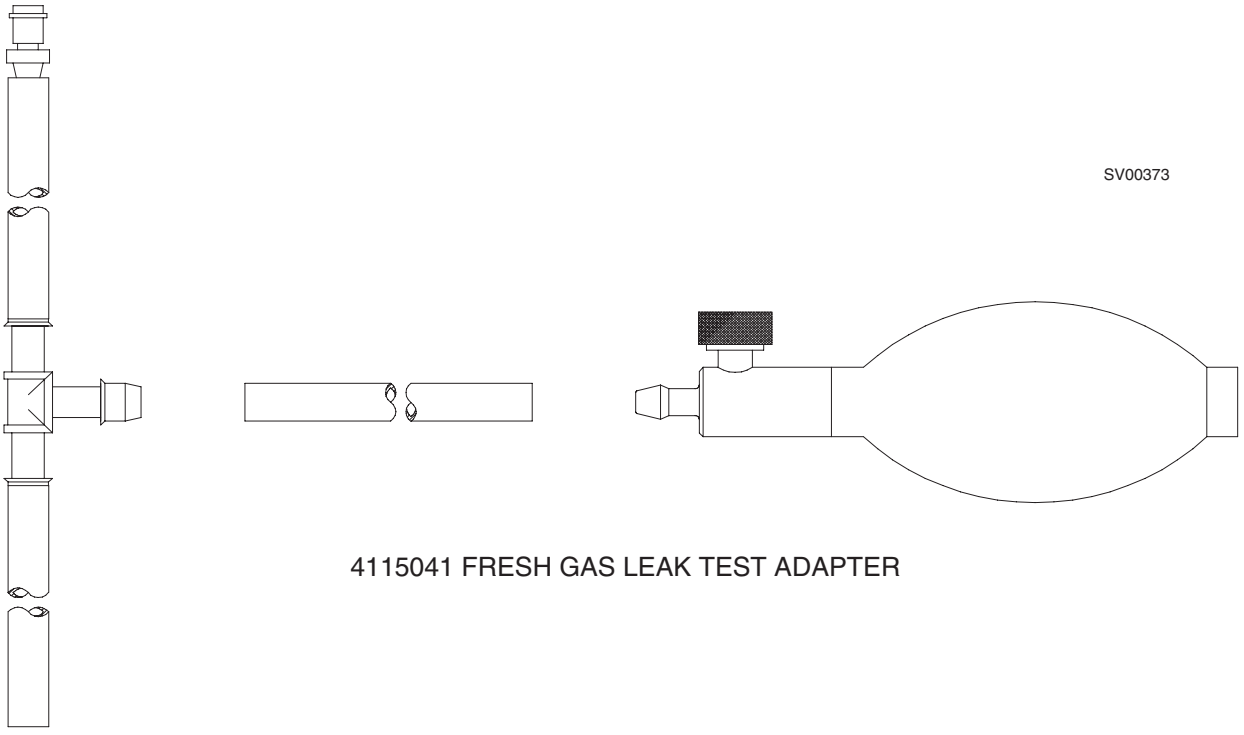
Special test fixtures are illustrated on following pages.



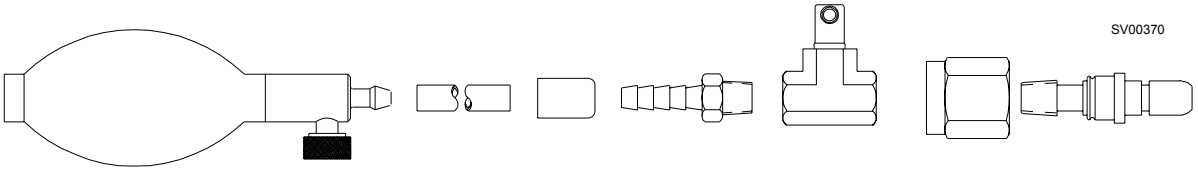
TEST EQUIPMENT FOR AGENT
ANALYZER ACCURACY TEST



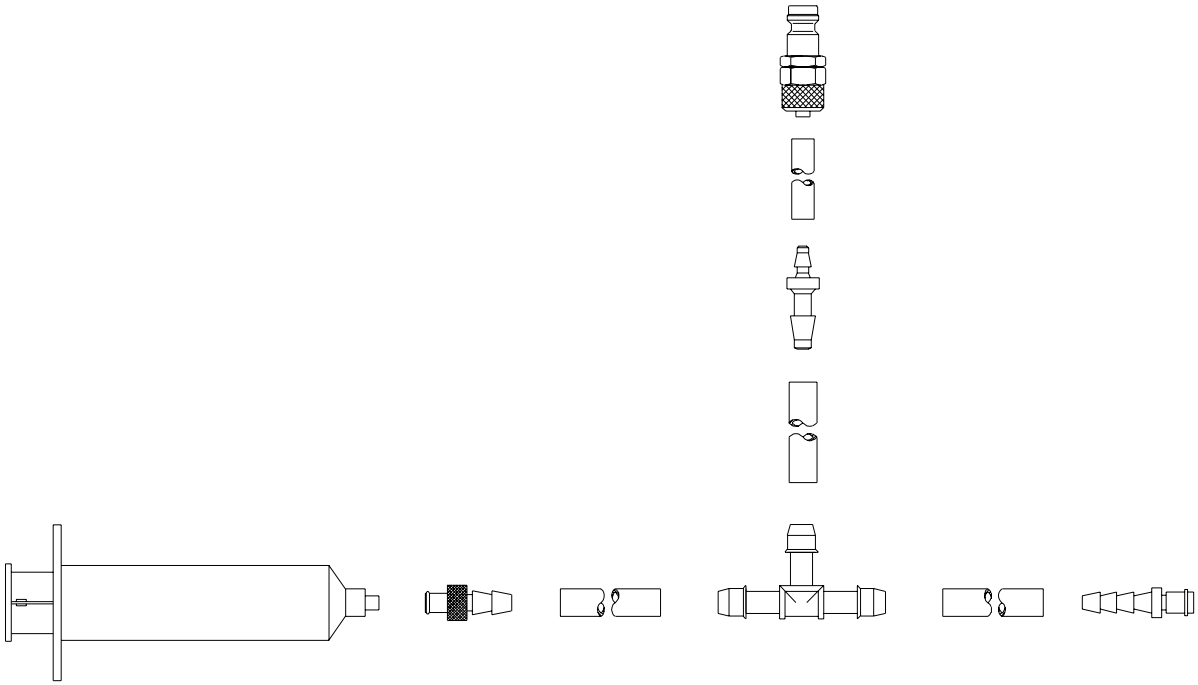
S010159 BREATHING SYSTEM LEAK TEST DEVICE



4115041 FRESH GAS LEAK TEST ADAPTER

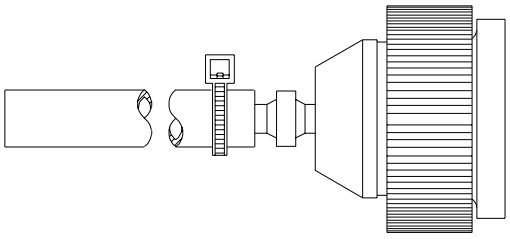


4115039 SUCTION PIPELINE ADAPTER

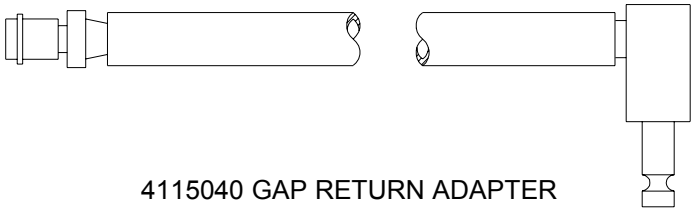


4115043 PDM TO MONITOR ADAPTER

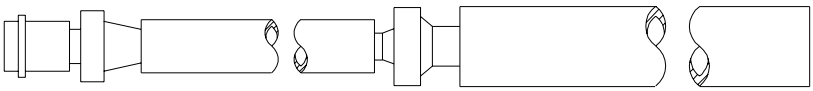
SV00372



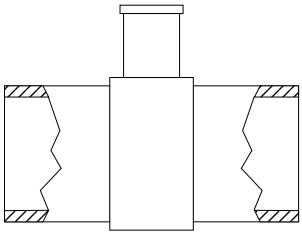
4115042 VOLUMETER/ FRESH GAS HOSE ADAPTER



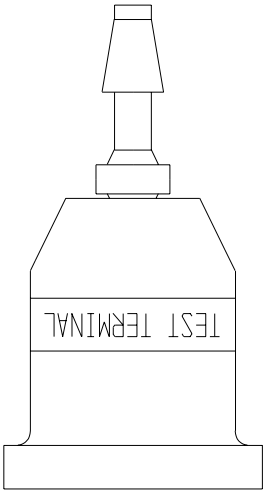
4115040 GAP RETURN ADAPTER



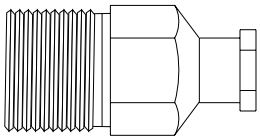
4115038 PDM TO PATIENT SUCTION ADAPTER



4108104
15mm(F) x 15mm(M)
AIRWAY ADAPTER
w/LUER(F) CONNECTOR

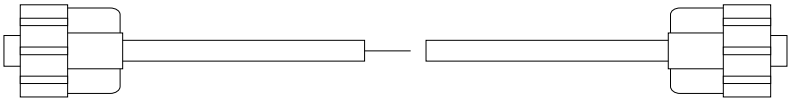


4104389
TEST TERMINAL
ADAPTER



4110709
LUER(F) x1/8 MPT

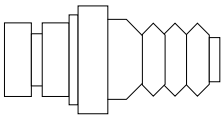
ADAPTER FOR TOP PORT
ON CAPNOMED FLOW METER



4108103
96 IN. PVC SAMPLE LINE w/LUER FITTINGS

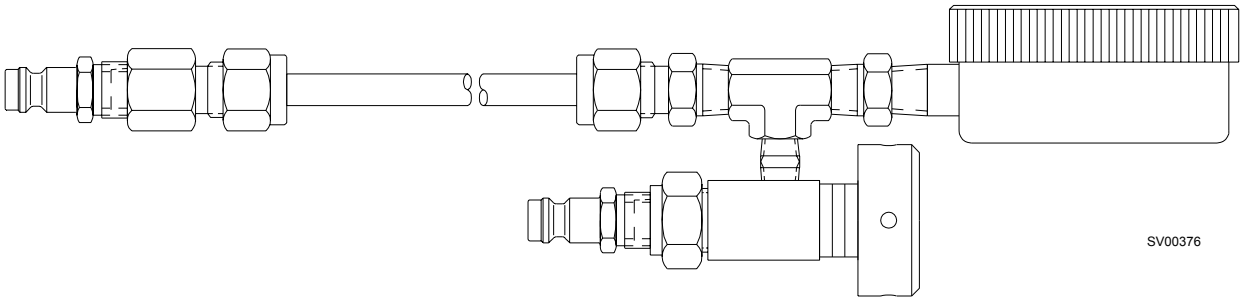
4115090
DISPOSABLE PIPET

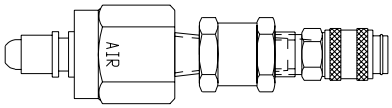
SV00374



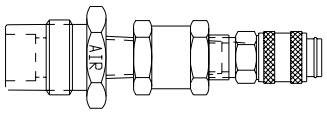
M31581
QDISC, MALE FRESH GAS

4114807 PRESSURE TEST ASSEMBLY , WITH ADAPTERS





4114830-002



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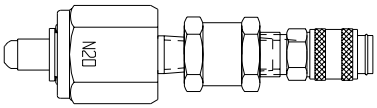

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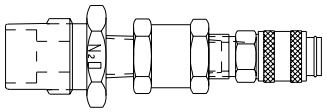

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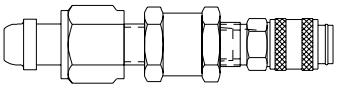
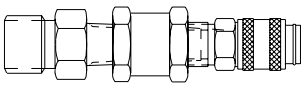
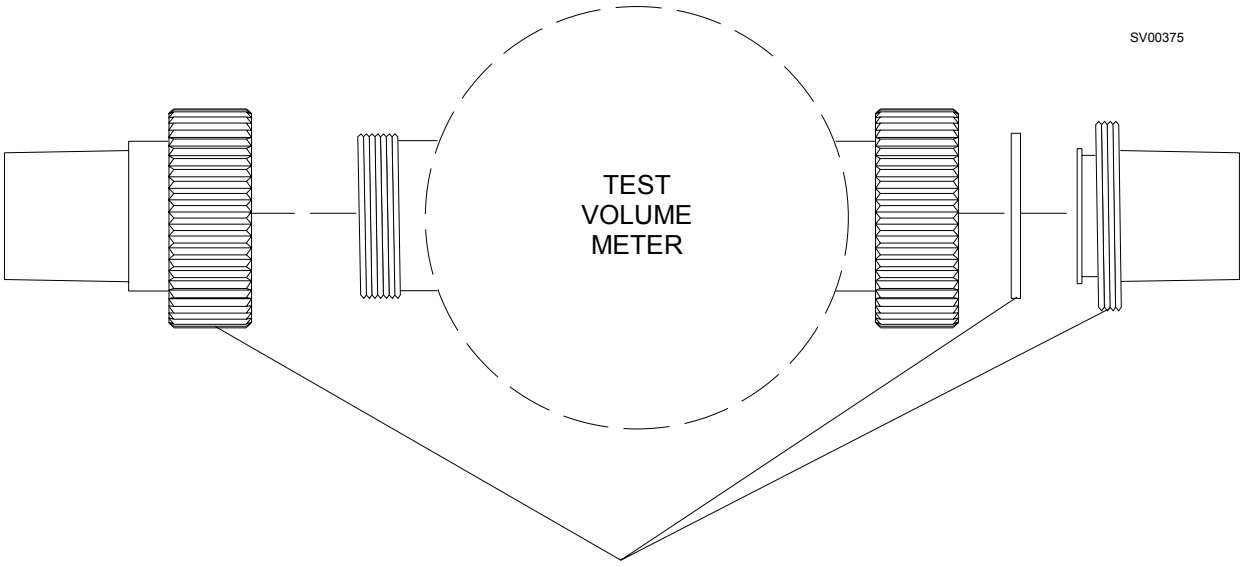


4114830-006



4114830-005



4115087 33mm x 22mm ADAPTER

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Periodic Manufacturer's Certification General Instructions

The purpose of these procedures is to provide detailed instructions for performing a Periodic Manufacturer's Certification (PMC) inspection on the Narkomed 6000 anesthesia machine.

A PMC consists of a complete Periodic Manufacturer's Service procedure and a certification level inspection based on Draeger Medical, Inc. Recommendations and equipment performance. Additional inspections are also performed to ensure proper product labeling.

Several additional documents have been created to assist the technician through the process. Following is a brief description of the purpose of each document.

Field Service Procedure:
Periodic Manufacturer's Certification Forms - Part Number SP00175.
This procedure illustrates the sample checklists with typical periodic maintenance items filled in, including vapor concentration verification tests, parts replaced, general comments and certification levels. Also included are sample PMC labels marked to show several levels of certifications. An excerpt from Draeger Medical, Inc.'s *Anesthesia System Risk Analysis and Risk Reduction* is included, and also a sample of an Executive Summary to be furnished to the hospital's Risk Manager or Chief of Anesthesia.

Field Service Procedure:
DMI Recommendation Guidelines Index Anesthesia Systems - Part Number S010250.
This Guideline was created to provide an assessment of each machine's certification. It contains various comprehensive overviews of possible equipment conditions and their associated certification levels.

The first list in the Recommendation Guidelines is a reference chart for machine certification based on equipment status. The second is an abbreviated summary of all DMI Recommendations and Failure Codes including the Condition Number, Equipment Condition, Recommended Corrections, Certification Code, and Tests Affected when applicable.

There is also a matrix classified as "Failure Codes" which identifies the correct manner in which to document equipment tests that fail, or were unable to be performed due to circumstances beyond the control of the service technician performing the inspection. (Ex: Air cylinder supply is unavailable to perform Air High Pressure Leak test.) The Failure Codes section also indicates suggested resolution of the situation. Failure Code numbers begin at 34 and use the same certification levels strategy, and carry the same weight as NAD Recommendation equipment condition codes.

The final matrix is the most comprehensive index sorted by machine model and includes Equipment Condition, Certification Code, and DMI Recommendations. It also specifies any suggested upgrade path including ordering information that should be taken such as installing a Bellows with Pressure Limit Control 4109664-S01 Kit, after market modification kit to a machine not equipped with pressure limit control.

The letters A, B, C, D and the Roman Numerals I, II are used as codes in the individual matrix for each model of anesthesia machine. The letters A, B, C, and D are used in descending order to indicate the certification level of the equipment. They are as follows:

A = Certified
B = Certified with Recommendations
C = Conditionally Certified
D = No Certification

Roman Numerals I and II do not affect the certification level but rather are provided to give further instructions to the end user as follows:

I = The system in its present configuration shall only be used with a CO2 monitor incorporating an apnea warning. The operator of the system is advised to frequently scan the CO2 readings and alarm thresholds.

II = The present configuration of equipment requires that the unit operate at all times with an oxygen analyzer that includes a low oxygen warning. The operator of the system is advised to frequently scan the oxygen readings and alarm limits.

Following is an explanation of machine certification levels:

Certified- No recommendations apply to machine being inspected. (Only item number 33 - "No Recommendations" shall apply for this certification level.)

Certified with Recommendations- A numbered recommendation with a code of B applies to the machine being examined.

Conditionally Certified- A numbered recommendation with a code of BC, BCI or BCII applies to the machine being examined.

No Certification- A numbered recommendation with a code of D applies to the machine being examined.

When multiple recommendations apply, use the above list in descending order from bottom to top. For example, "No Certification would take precedence over "Conditionally Certified" and "Certified with Recommendations". "Conditionally Certified" would take precedence over "Certified with Recommendations".

For example:

A **Narkomed 3** could have recommendationnumber 21 and failure code 61.1 apply.
21 - No ventilator pressure limit control. Code is B.
61.1 - Enflurane agent is unavailable to test. Code is BC.
Correct certification for this machine is BC, which means CONDITIONALLY CERTIFIED WITH RECOMMENDATIONS.

A **Narkomed 4** could have recommendation numbers 14 and 21 apply.
14 - CO2/Agent monitor exhaust port is not properly connected to the waste gas scavenger. Code B.
21 - No ventilator pressure limit control. Code B.
The correct certification for this machine is B, which means “CERTIFIED WITH RECOMMENDATIONS”.

A **Narkomed 2B, 2C** or **GS** could have recommendation 30 apply.
30 - Anesthesia machine is equipped with inhalation anesthesia vaporizers without an agent analyzer in the breathing system. Code B.
The correct certification for this machine is B, which means “CERTIFIED WITH RECOMMENDATIONS”.

A **Narkomed 6000** could have no NAD recommendations or failure codes apply. The correct certification level for this machine is Code A, “CERTIFIED”.

Code D, which means “NO CERTIFICATION”, also means the machine shall not receive a Periodic Manufacturer’s Certification label. The machine shall also receive a “WARNING - This System is Not Certified” label, P/N 4114857. This label shall be placed at a prominent location on the right side of the machine after all other previous PM and “Vigilance Audit® Validation” labels have been removed.

PM Certification Procedure for Narkomed 6000 Anesthesia System

1. Use the PM Certification form P/N 4115093 for the Narkomed 6000 Anesthesia System. If the system is equipped with an Integrated Patient Monitor or Strip Chart Recorder, use the Integrated Monitor and Strip Chart form P/N 4116820.

2. Completely fill in the header information.

3. Perform the vapor concentration test on all Dräger vapor vaporizers every six months in accordance with SP00073 at a six month maximum interval. Perform the vaporizer concentration test on all Desflurane vaporizers in accordance with SP00091 for fixed mount vaporizsers and SP00189 for user removable D-tec vaporizers at a six month maximum interval. For every vaporizer tested, fill out a "VAPOR VAPORIZER CALIBRATION CHECK" label (part # S010016). Information on this label shall include your signature, type of agent, date tested, test results @ 1%, 2.5%, 4% for H, E, I, or S vaporizers, or @ 4%, 10%, 12%, 16% for Desflurane vaporizesrs, and a PASS or FAIL indication. This label shall be attached to the upper right side of the vaporizer. If vaporizer fails the concentration verification, internal leak, or exclusion system tests, check "NO" in the "RECOMMENDED FOR USE" section on the PM Certification form.

   Place a "CAUTION DO NOT USE" label (part # 4114327) on the vaporizer, and issue a departmental alert. The TSR shall also seek permission from the equipment operator to remove the failed vaporizer from the machine and install a replacement vaporizer or an adapter block onto the mount.All nonfunctional Dräger vaporizers must be removed from service for machine to receive certification.

4. Proceed with PM Certification in accordance with Section 6 and Section 6A if equipped with an Integrated Patient Monitor or Strip Chart Recorder. If any tests fail refer to the "Failure Codes" listing in DMI Recommendations Guidelines Index, P/N S010250, to determine correct certification level starting point. Failure codes shall be documented on the "RECOMMENDATIONS / GENERAL COMMENTS" section of the PM Certification form and on the Executive Summary if applicable. If a test fails that has not been identified by the "Failure Codes" list, consult with Draeger Medical, Inc. to assess the proper certification level.

PM Certification Procedure for Narkomed 6000 Anesthesia System

5. Based on the “EQUIPMENT CONDITION” inspect the machine for any “DMI RECOMMENDATIONS” that would apply. Use the Narkomed 6000 section of the “DMI RECOMMENDATION GUIDELINES INDEX”, P/N S010250. Note all applicable DMI recommendations on the Executive Summary. NOTE: If using a carbon form, indicate the Equipment Condition number and to see reverse side under “RECOMMENDATIONS / GENERAL COMMENTS” section of the form.

6. Determine the correct certification level of the machine based on the combined lowest common denominator of “Equipment Conditions” and “Failure Codes”. If the machine is at least conditionally certified, fill out the “PM CERTIFICATION” label. Check the box(s) on the validation label where appropriate. Write the month and year, (three months from date of PM Certification) next to “NEXT VISIT DUE:” If certification level is “D”, machine shall not receive a “PM CERTIFICATION” label. Any machine not receiving a PM Certification label shall receive a “WARNING NOT CERTIFIED” label. This label shall be placed at a prominent location on the left side of the machine after all other previous PMS and Vigilance Audit Validation labels have been removed.

7. In the “CERTIFICATION LEVEL” section of the PM Certification form, record the last visit certification level, the current certification level and the next visit due month and year, (three months from date of PM Certification) in the spaces provided.

8. If applicable, remove the previous PM CERTIFICATION VALIDATION label and attach the new label (P/N S010006 w/phone #, or P/N S010007) in a prominent location on the rear of the anesthesia machine.

9. Check the appropriate boxes on the “PM CERTIFICATION NOTICE” label, (part # S010011). If the machine is not certified, the last box of this notice label shall be checked. Attach this notice to the flow shield of the anesthesia machine.

10. Have the customer sign each PM Certification form or the Executive Summary, and review the equipment conditions and recommendations with the customer.

11. Return the top copy to Draeger Medical, Inc. Service Department, keep middle copy for service organization records, give bottom copy to customer.

6.1 Service Menu

6.1.1 Setup Notebook

6.1.1.1 Press the SETUP key to display the Setup Notebook

6.1.1.2 Press the ABOUT tab to display the About page

6.1.1.3 Press the following keys in this order:

--Volume, Pressure, Oxygen
--Gas Analysis
--NM6000
--Strip Chart Recorder

6.1.1.4 Press OK to enter the Service Mode

6.1.2 Service Data

6.1.2.1 Press the NM6000 tab, the Service Config. key, and the NM6K tab.

6.1.2.2 Press the Service Config key, then press the PMC key.

6.1.2.3 Enter your technical service ID and press OK. Press Cancel to close the Service Replacement Parts dialog box.

(✔) 6.1.2.4 Record the Last Service Date

(✔) 6.1.2.5 Record the Hours Running Since Last Service

(✔) 6.1.2.6 Record the Total Machine Run Hours

6.1.2.7 Press RESET LAST SERVICE DATE

(✔) 6.1.2.8 Advance the PMS Due Date three months ahead and record the date.

(✔) 6.1.2.9 Enter the Service Log menu and press the Refresh key (if software version is ≥ 3.00 select “SERVICE”); identify any critical events.

(✔) 6.1.2.10 Record the unit serial number located on the rear of the machine

(✔) 6.1.3 Service Dump

6.1.3.1 Press the Service Dump key

6.1.3.2 Verify that GAP and VPO exception errors are all zeros. If fitted with IPMM (CV) or SCR, verify these pod exception errors are all zeros.

6.1.4 Service Monitors

6.1.4.1 Press the Service Monitors key to display the Service Monitors notebook

(✔) 6.1.4.2 Press the Oxygen tab and follow the instructions to perform an O_2 zero calibration

(✔) 6.1.4.3 Press the Pressure tab and follow the instructions to perform a Zero and Span calibration

(✔) 6.1.4.4 Press the Screen tab and perform the touch screen calibration.

NOTE: An advanced touch screen calibration procedure is needed when calibration is not possible under the usual procedure. Refer to Section 5 for the complete procedures.

(✔) 6.1.4.5 Press the Ports tab and verify that settings are correct for any interfaced devices

CAUTION: Use ESD precautions when handling the PCB assemblies. Static discharge can damage components on these assemblies.

6.1.5 Press the Service Config key; Press the SERVICE PARTS key. Refer to the machine's replacement components log and install any scheduled replacement parts required.

(✔) 6.1.5.1 Record any scheduled parts replaced - in the Service Log and on the report.

Scheduled parts replacement intervals are shown in the table on the following page.

6.1.5.2 Press the Exit Service key.

6.1.5.3 Press the OK button at the bottom of the Service Mode window.

6.1.5.4 Press the To Primary Keys key.

SCHEDULED REPLACEMENT PARTS ON NM6000

Interval	P/N	Description	Qty
6 Month Kit P/N 4115074-001	M29664	Roller Diaphragm (patient side)	1
	8404065	Lip Seals (pneumatic interface)	5
	4114887	Filter	1
	4115961	Semi-permeable tube	1
1 Year Kit P/N 4115074-002	4115864	O-ring (vapor mount)	4
	M29664	Roller Diaphragm (patient side)	1
	8404065	Lip Seals (pneumatic interface)	5
	4114887	Filter	1
	4115961	Semi-permeable tube	1
2 Year Kit P/N 4115074-003	8407979	Sealing Washer (breasy)	2
	8410181	Diaphragm (breasy)	2
	M30462	Diaphragm (breasy)	3
	M27721	Lip Seal (piston interface to breasy)	1
	8404065	Lip Seal (piston interface to Divan)	2
	4115864	O-ring (vapor mount)	4
	M29664	Roller Diaphragm (patient side)	1
	8404065	Lip Seals (pneumatic interface)	5
	4116144	Lithium Battery, 3V (WPU)	1
	4114887	Filter	1
	4115961	Semi-permeable tube	1
3 Year Kit P/N 4115074-004	1841688	Lithium Battery (TK-RAM, IRIA PCB)	1
	8301856	9V Battery (Divan motherboard)	1
	M29664	Roller Diaphragm (patient side)	1
	8404065	Lip Seals (pneumatic interface)	5
	4115864	O-ring (vapor mount)	4
	4114887	Filter	1
	4115961	Semi-permeable tube	1
	M29320	Absorber	1
	M30455	Lip Seal	1
	M30456	Packing Ring	1

6.1.6 Dusting and Lint Cleaning Procedure

This procedure must be performed at a 1-year maximum interval. If the ambient air in the local environment contains a significant amount of dust and lint, the cleaning frequency must be increased to compensate for these conditions.

WARNING: Use only current-limiting vacuum cleaning devices (Ohmega Supreme or equivalent). Failure to observe this precaution may cause injury by electrical shock.

CAUTION: Use ESD precautins when handling any electronic assemblies. This machine contains static sensitive components. Use only ESD compatible vacuum cleaning devices (Ohmega Supreme or equivalent).

6.1.6.1 Turn the System Power switch to STANDBY.

6.1.6.2 Remove AC power from the machine. Wait 5 minutes for the processor to shut down, then pull all circuit breakers to their 'out' position.

WARNING: Before servicing, ensure that AC power is removed from the machine and all circuit breakers are disengaged (pulled out). Failure to observe this precaution may cause injury by electric shock.

CAUTION: Failure to wait 5 minutes before pulling circuit breakers will crash the hard drive and may damage the WPU.

6.1.6.3 Close all cylinder valves and remove the cylinders from their yokes.

6.1.6.4 Remove the Vitalbus Hub mounting hardware (do not disassemble the hinge hardware). Remove the power cord strain relief and swing open the assembly.

6.1.6.5 Remove the lower and upper back panels. If fitted with a CRT, disconnect the fan's power cable.

6.1.6.6 If fitted with an IPMM, disconnect the Vitalbus cable and loosen the assembly's captive mounting screw, then slide the assembly out from its housing. Vacuum around the fan at the rear of the POD and the grille on the bottom of the assembly.

6.1.6.7 Disconnect the GAP's seri-permeable tube, Vitalbus cable, and exhaust hose. Loosen the assembly's captive mounting screw and slide the assembly out from its housing.

6.1.6.8 Remove the Remove the cover from the analyzer assembly. There are four screws on the bottom and one screw at the back.

6.1.6.9 Loosen the two upper screws securing the left side panel of the analyzer and swing open the panel.

6.1.6.10 Vacuum debris from the assembly and pay particular attention to the fan at the rear of the POD and the grille on the bottom of the assembly.

6.1.6.11 Close the left hinged side of the analyzer and tighten the retaining screws.

6.1.6.12 Reinstall the cover on the analyzer.

6.1.6.13 Vacuum inside POD housings and pat particular attention to the bottom cockpit cover grille.

6.1.6.14 If fitted with an IPMM, slide the assembly into its upper housing. Tighten its retaining screw and reconnect the Vitalbus cable.

6.1.6.15 Slide the GAP into its lower housing and tighten its retaining screw. Reconnect the semi-permeable tube, Vitalbus cable, and exhaust hose.

6.1.6.16 Vacuum inside the CRT/flat panel housing. If fitted with a CRT, vacuum around this assembly and the fan mounted to the top back panel.

6.1.6.17 Vacuum the WPU's power supply fan ventilation grille located at the right side panel of the assembly.

6.1.6.18 Vacuum the Vitalbus fan and ventilation grille.

6.1.6.19 Vacuum the power supply ventilation grills located on the left and right sides of the assembly.

6.1.6.20 If fitted with a CRT, reconnect the fan's power cable. Install the lower and upper back panels.

6.1.6.21 Close the Vitalbus Hub door. Reattach the power cord strain relief and secure the assembly.

6.1.6.22 Reattach the cylinders to their yokes.

6.1.6.23 Reset all circuit breakers to their 'in' position. Restore AC power to the machine.

(✔) **6.2 Battery Circuit**

6.2.1 With the System Power switch ON, Press the PERFORM BATTERY TEST key in the SETUP notebook.

6.2.2 Is BATTERY TEST REQUESTED message displayed? ___(Y)

6.2.3 Does the Battery Test pass? ___(Y)

6.2.4 Unplug the AC power cord.

6.2.5 Does the AC PWR FAIL message appear on the monitor? ___(Y)

6.2.6 Plug in the AC power cord.

(✔) 6.3 Open Reservoir Scavenger - if applicable

6.3.1 Cleaning

6.3.1.1 Remove the scavenger hose and drain any accumulated moisture. Inspect the hose for deterioration and replace it if needed.

6.3.1.2 Disconnect the hospital vacuum source from the scavenger.

6.3.1.3 Remove the scavenger mounting screws.

6.3.1.4 Remove the four screws securing the access panel at the bottom of the scavenger canister.

6.3.1.5 Remove and inspect the silencer; replace if needed.

6.3.1.6 Remove the flowmeter from its housing by turning it counter-clockwise. Inspect the tube and clean it with compressed air if needed.

6.3.1.7 Reassemble the scavenger, and reactivate the vacuum source.

6.3.2 Negative Pressure Relief test:

6.3.2.1 Connect a DISS vacuum hose to the threaded terminal on the scavenger. Alternatively, a hose barb adapter can be used to attach a wall suction hose to the scavenger.

6.3.2.2 Connect a short 22 mm breathing hose (P/N 9995112) from the inspiratory valve to the expiratory valve on the absorber. Set the Divan to the Manual/Spontaneous Mode.

6.3.2.3 Verify that the suction waste gas disposal system is active.

6.3.2.4 Adjust the scavenger needle valve until the flowmeter indicates between the white lines. Close all flow control valves on the anesthesia machine.

6.3.2.5 Ensure that the unused scavenger port has the sealing plug in place.

6.3.2.6 Uncap the hose barb adapter at the rear of the scavenger and connect a test pressure monitor to the hose barb on the adapter and observe the reading on the test gauge. The gauge shall indicate a pressure of 0 to -0.5 cm H_2O.

6.3.3 Positive Pressure Relief test:

6.3.3.1 Turn the scavenger needle valve fully clockwise (closed).

6.3.3.2 Open the oxygen flow control valve on the anesthesia machine to a flow of 10 L/min.

6.3.3.3 The flow of oxygen shall now exit the system through the relief ports at the top of the canister. The test pressure gauge shall indicate a pressure of less than 1.0 cm H_2O.

6.3.3.4 After the test, remove test equipment, re-cap the scavenger adapter port and reconnect the scavenger hose. Readjust the scavenger needle valve for a flowmeter indication halfway between the two white lines.

(✔) **6.4 Scavenger Interface, A/C - if applicable**

6.4.1 Cleaning

6.4.1.1 Remove the scavenger hose and drain any accumulated moisture. Inspect the hose for deterioration and replace it if needed.

6.4.1.2 Remove the safety relief valve housing by unscrewing it in a counter-clockwise direction.

6.4.1.3 Inspect the O-ring and replace it if needed.

6.4.1.4 Remove the safety relief valve from its housing by twisting it out in a counter-clockwise direction. The tips of locking needle-nose pliers can be used to turn the valve. Be careful not to damage the disk.

6.4.1.5 Remove any accumulated lint or dust from the valve with a soft brush. The valve may be further cleaned with a low flow of clean air or oxygen. The scavenger body can be cleaned with a moist cloth.

6.4.1.6 Reinstall the valve into the housing, making sure that it is threaded all the way into the housing and that the plastic washer is properly seated on its upper surface.

6.4.1.7 Make sure that the interior of the valve body is completely dry. Reinstall the valve housing onto the scavenger body, making sure that the O-ring is properly seated.

6.4.2 Positive Pressure Relief test:

6.4.2.1 Reconnect the scavenger hose between the bottom of the Divan and the scavenger. Ensure that the unused scavenger port has the sealing plug in place.

6.4.2.2 Connect a short 22 mm breathing hose (P/N 9995112) from the inspiratory valve to the expiratory valve on the absorber.

6.4.2.3 Set the Divan to the Manual/Spontaneous Mode.

6.4.2.4 Set the oxygen flow to 10 L/min. and occlude the bottom port on the scavenger.

6.4.2.5 The flow of oxygen will eventually exit the system through the positive pressure safety relief valve. At this point, the breathing pressure waveform on the monitor shall indicate a pressure of 10.0 cm H_2O or less.

6.5 Suction Regulator

6.5.1 Verify that the suction bottle is attached to the suction regulator.

6.5.2 Verify that a vacuum hose is attached to the ¾ in. DISS vacuum connection.

6.5.3 Set the vacuum on/off valve to the OFF (vertical) position.

6.5.4 Using a PDM/suction adapter P/N 4115038, connect a digital pressure meter to the collecting inlet stem of the suction bottle.

6.5.5 Set the digital pressure meter to the mmHg scale.

6.5.6 Turn the vacuum control knob fully counter-clockwise.

(✔) 6.5.7 What is the vacuum indicated on the digital pressure meter? (0)

6.5.8 Turn the vacuum control knob fully clockwise and verify that the vacuum control knob stops.

6.5.9 Set the vacuum on/off valve to the ON position.

6.5.10 Set the regulator to indicate 250 mmHg.

(✔) 6.5.11 What is the vacuum indicated on the digital pressure meter? (200-300 mmHg)

6.5.12 Remove the test equipment and return all controls to their original positions.

(✔) **6.6 Suction Switch**

6.6.1 Remove the patient suction assembly.

6.6.2 Set the suction switch to the closed (down) position.

6.6.3 Activate the hospital vacuum pipeline supply.

6.6.4 Connect a pressure measuring device and suction adapter w/squeeze bulb (P/N 4115039) to the suction fitting on the left side of the NM6000.

6.6.5 Pressurize the connection to 50 cm H_2O.

6.6.6 After 10 seconds, what is the pressure? ___(>30 cm H_2O)

6.6.7 Remove the squeeze bulb and replace it with a test terminal (P/N 4104389), 33mm x 22mm adapter (P/N 4115087) and volumeter.

6.6.8 Set the suction switch to the open (up) position.

6.6.9 What is the suction pipeline flow rate? ___(>30L/min)

6.6.10 Remove all test equipment and reconnect the patient suction assembly.

6.7 High Pressure Leak

(✔) 6.7.1 Yoke Verification

6.7.1.1 Turn the System Power switch to STANDBY, and close all cylinder valves.

6.7.1.2 Disconnect the pipeline supply hoses at the wall outlets.

6.7.1.3 Remove the closed cylinder or yoke plug from each yoke assembly.

6.7.1.4 Do all the yoke handles adjust smoothly? ___(Y)

6.7.1.5 Are the two (2) yoke pins installed securely in each yoke? ___(Y)

6.7.1.6 Is there only one (1) cylinder washer on each yoke assembly? ___(Y)

6.7.1.7 Is there a yoke plug attached to each yoke assembly? ___(Y)

6.7.1.8 Is the proper gas identification label attached to each yoke assembly? ___(Y)

6.7.1.9 Attach a cylinder to each yoke assembly.

(✔) 6.7.2 Nitrous Oxide High Pressure Leak Test - if applicable

6.7.2.1 Open one (1) oxygen cylinder valve and one (1) nitrous oxide cylinder valve.

6.7.2.2 Does the cylinder gauge respond properly? ___ (Y)

6.7.2.3 Let the pressure stabilize.

6.7.2.4 Close the nitrous oxide cylinder valve and remove the cylinder.

6.7.2.5 Observe the nitrous oxide cylinder pressure gauge.

6.7.2.6 Is the nitrous oxide cylinder gauge cover label correct? ___(Y)

6.7.2.7 After two (2) minutes, what is the pressure loss? ___PSI (<50)

6.7.2.8 Attach the cylinder.

(✔) 6.7.3 Oxygen High Pressure Leak Test

6.7.3.1 Open one (1) oxygen cylinder valve.

6.7.3.2 Does the cylinder gauge respond properly? ___(Y)

6.7.3.3 Let the pressure stabilize.

6.7.3.4 Close the oxygen cylinder valve and remove both oxygen cylinders.

6.7.3.5 Observe the oxygen cylinder pressure gauge.

6.7.3.6 Is the oxygen cylinder gauge cover label correct? ___(Y)

6.7.3.7 After two (2) minutes, what is the pressure loss? ___PSI (<50)

6.7.3.8 Attach the cylinders.

(✔) 6.7.4 Air High Pressure Leak Test - if applicable

6.7.4.1 Open the Air cylinder valve.

6.7.4.2 Does the gauge respond properly? ___(Y)

6.7.4.3 Let the pressure stabilize.

6.7.4.4 Close the air cylinder valve and remove the cylinder.

6.7.4.5 Observe the air cylinder pressure gauge.

6.7.4.6 Is the air cylinder gauge cover label correct? ___(Y)

6.7.4.7 After two (2) minutes, what is the pressure loss? ___psi (<50)

6.7.4.8 Attach the cylinder.

6.8 Regulator and Pipeline Gauges

Minimum cylinder pressures for regulator tests are:
N2O & CO2: 600 psi; O2, Air, He, He/O2, N2: 1000 psi.

6.8.1 N2O Regulator

6.8.1.1 Turn the System Power switch to ON, and press the Divan Standby key.

6.8.1.2 Configure the test gauge (P/N 4114807) using a N_2O nut/stem DISS connector (P/N 4114830-004) on the hose, and N_2O DISS body connector (P/N 4114830-003) on the valve body side.

6.8.1.3 Connect the test fixture hose to the machine's nitrous oxide pipeline inlet.

6.8.1.4 Does the back panel correctly identify the nitrous oxide inlet? ___(Y)

6.8.1.5 Connect the nitrous oxide pipeline supply hose to the test fixture.

6.8.1.6 Open the nitrous oxide and the oxygen cylinder valves.

6.8.1.7 Set the oxygen and nitrous oxide flows to 4 L/min.

6.8.1.8 Depress the push button on the test device.

(✔) 6.8.1.9 Release the push button. After the pressure decay stabilizes, what is the regulator output pressure? ___psi (40-49)

NOTE: If a pressure decrease does not occur, either the hospital's supply pressure is too low or the regulator pressure is set too high.

(✔) 6.8.2 N2O Pipeline Gauge Accuracy

6.8.2.1 Close the nitrous oxide cylinder valve and drain all nitrous oxide pressure.

6.8.2.2 Depress and hold the push button on the test device.

6.8.2.3 Does the nitrous oxide gauge respond properly? ___(Y)

6.8.2.4 After the pressure stabilizes, are the indicated pressures on the test gauge and the nitrous oxide pressure gauge within 5 psi of each other? ___(Y)

(✔) 6.8.3 N2O Pipeline Leak

6.8.3.1 Close the nitrous oxide flow control valve.

6.8.3.2 Release the test device push button.

6.8.3.3 After 30 seconds, what is the pressure loss? ___psi (<5)

6.8.3.4 Remove the test equipment and reconnect the nitrous oxide pipeline hose.

6.8.4 Air Regulator - if applicable

6.8.4.1 Configure the test gauge (P/N 4114807) using an air nut/stem DISS connector (P/N 4114830-002) on the hose and a DISS body connector (P/N 4114830-001) on the valve body side.

6.8.4.2 Connect the test fixture hose to the machine's air pipeline inlet.

6.8.4.3 Does the back panel correctly identify the air inlet? ___(Y)

6.8.4.4 Connect the air pipeline supply hose to the test fixture.

6.8.4.5 Set the air flow to 4 L/min.

6.8.4.6 Depress the push button on the test device.

(✔) 6.8.4.7 Release the push button. After the pressure decay stabilizes, what is the regulator output pressure? ___psi (based upon cylinder pressure as given in the following table)

Cylinder Pressure (psi)	Compensated Regulator output tolerances (-4/+2)
2000	38 - 44 (*41 - 47)
1800	39 - 45 (*42 - 48)
1600	40 - 46 (*43 - 49)
1400	41 - 47 (*44 - 50)
1200	42 - 48 (*45 - 51)
1000	43 - 49 (*46 - 52)

* Canada settings

NOTE: If a pressure decrease does not occur, either the hospital's supply pressure is too low or the regulator pressure is set too high.

(✔) 6.8.5 Air Pipeline Gauge Accuracy - if applicable

6.8.5.1 Close the air cylinder valve and drain all air pressure.

6.8.5.2 Depress the push button on the test device.

6.8.5.3 Does the air gauge respond properly? ___(Y)

6.8.5.4 After the pressure stabilizes, are the indicated pressures on the test gauge and the air pressure gauge within 5 psi of each other? ___(Y)

(✔) 6.8.6 Air Pipeline Leak

6.8.6.1 Close the air flow control valve

6.8.6.2 Release the test device push button

6.8.6.3 After thirty (30) seconds, what is the pressure loss? ___psi (<5)

6.8.6.4 Remove the test equipment and reconnect the air pipeline hose.

6.8.7 O2 Regulator

6.8.7.1 Configure a test gauge (P/N 4114807) using an O_2 nut/stem DISS connector (P/N 4114830-006) on the hose and an O_2 DISS body connector (P/N 4114830-005) on the valve body side.

6.8.7.2 Connect the test fixture hose to the machine's oxygen pipeline inlet.

6.8.7.3 Connect the oxygen pipeline supply hose to the test fixture.

6.8.7.4 Does the back panel correctly identify the oxygen inlet? ___(Y)

6.8.7.5 Set the oxygen flow to 4 L/min.

6.8.7.6 Depress the push button on the test device.

(✔) 6.8.7.7 Release the push button. After the pressure decay stabilizes, what is the regulator output pressure? ___psi (based upon cylinder pressure as given in the following table)

Cylinder Pressure (psi)	Compensated Regulator output tolerances (-4/+2)
2000	38 - 44 (*41 - 47)
1800	39 - 45 (*42 - 48)
1600	40 - 46 (*43 - 49)
1400	41 - 47 (*44 - 50)
1200	42 - 48 (*45 - 51)
1000	43 - 49 (*46 - 52)

* Canada settings

NOTE: If a pressure decrease does not occur, either the hospital's supply pressure is too low or the regulator pressure is set too high.

(✔) 6.8.8 O2 Pipeline Gauge Accuracy

6.8.8.1 Close the oxygen cylinder valve and drain all oxygen pressure.

6.8.8.2 Depress the push button on the test device.

6.8.8.3 Does the oxygen gauge respond properly? ___(Y)

6.8.8.4 After the pressure stabilizes, are the indicated pressures in the test gauge and the oxygen pressure gauge within 5 psi of each other? ___(Y)

(✔) 6.8.9 O2 Pipeline Leak

6.8.9.1 Release the test device push button

6.8.9.2 After thirty (30) seconds, what is the pressure loss? ___psi (<5)

6.9 Oxygen Supply Failure Protection

(✔) 6.9.1 N2O OFP Device

6.9.1.1 Connect the O_2 and N_2O pipeline supplies.

6.9.1.2 Open the N_2O cylinder valve, if applicable.

6.9.1.3 Verify that the System Power switch is ON.

NOTE: This test can not be performed during the ventilator self test or while the ventilator is in the Standby Mode.

6.9.1.4 Press the Manual/Spontaneous button on the ventilator control panel to cancel the self test and set Manual/ Spontaneous Mode. If the Divan displays COMPLETE TEST, press the Ventilator Override switch.

6.9.1.5 Depress the push button on the test fixture.

6.9.1.6 Adjust the O_2 and N_2O flow to 4 L/min.

6.9.1.7 Close the O_2 pipeline supply.

6.9.1.8 Does the flow of nitrous oxide cease when the oxygen pressure is depleted? ___(Y)

6.9.1.9 Close the N_2O pipeline supply.

6.9.1.10 Close the nitrous oxide flow control valve.

(✔) 6.9.2 Air OFP Device

6.9.2.1 Open the O_2 and Air pipeline supplies.

6.9.2.2 Set the air flow to 4 L/min.; set the oxygen flow to 4 L/min.

6.9.2.3 Close the pipeline O_2 pipeline supply.

6.9.2.4 Does the flow of air cease when the oxygen pressure is depleted? ___(Y)

6.9.2.5 Close the Air pipeline supply.

6.9.2.6 Close the air flow control valve.

6.9.3 O2 Low Pressure Alarm

6.9.3.1 Depress and hold the test device push button.

6.9.3.2 Verify that minimum O_2 flow is present.

6.9.3.3 Release the test device push button.

(✔) 6.9.3.4 What is the pressure on the test gauge when the LO O_2 SUPPLY message appears on the monitor? ___psi (34-40)

6.9.3.5 Does the LO O_2 SUPPLY message appear on the central alarm display? ___(Y)

6.9.3.6 Remove pressure test gauge assembly.

6.10 Flowmeters

(✔) 6.10.1 Oxygen Flowmeter Test

6.10.1.1 Open the oxygen cylinder valve.

6.10.1.2 Is it possible to adjust the flow of oxygen over the full range of the flowmeters? ___(Y)

6.10.1.3 Close the O_2 cylinder valve and bleed the pressure from the system.

6.10.1.4 Connect the O_2 pipeline hose.

6.10.1.5 Is it possible to adjust the flow of oxygen over the full range of the flowmeters? ___(Y)

6.10.1.6 Is the correct flow control knob and label attached to the oxygen flow control valve? ___(Y)

6.10.1.7 Close the oxygen flow control valve.

(✔) 6.10.1.8 What is the minimum flow of oxygen? ___mL (*150-200)

* Minimum flow specification is given @ 50 psi. Deviations will affect this value.

(✔) 6.10.2 Nitrous Oxide Flowmeter Test

6.10.2.1 Set the oxygen flow to 4 L/min.

6.10.2.2 Open the nitrous oxide cylinder valve - if applicable.

6.10.2.3 Is it possible to adjust the flow of nitrous oxide over the full range of the flowmeters? ___(Y)

6.10.2.4 Close the nitrous oxide cylinder valve and bleed the pressure from the system.

6.10.2.5 Connect the N_2O pipeline hose.

6.10.2.6 Is it possible to adjust the flow of nitrous oxide over the full range of the flowmeters? ___(Y)

6.10.2.7 Is the correct flow control knob and label attached to the N_2O flow control valve? ___(Y)

6.10.2.8 Close the oxygen and nitrous oxide flow control valves.

(✔) 6.10.3 Air Flowmeter Test

6.10.3.1 Connect the Air pipeline hose.

6.10.3.2 Is it possible to adjust the flow of air over the full range of the flowmeter? ___(Y).

6.10.3.3 Close the air flow control valve.

6.10.3.4 Is the correct flow control knob and label attached to the air flow control valve? ___(Y)

(✔) 6.10.4 Auxiliary Oxygen Flowmeter Test

6.10.4.1 Connect a test pressure monitor to the outlet using a PDM adapter (P/N 4115033).

6.10.4.2 Bleed any pressure from the test device.

6.10.4.3 Is there an increase in pressure? ___(N)

6.10.4.4 Increase the pressure to 50 cm H_2O.

6.10.4.5 After 30 seconds, what is the pressure? ___ cm H_2O (30-50)

6.10.4.6 Remove the test gauge and adapter.

6.10.4.7 Is it possible to adjust the flow over the full range of the flowmeter? ___(Y)

6.10.4.8 Set the flow rate to 5 L/min.

6.10.4.9 Hold the sensor from a calibrated O_2 Med at the flowmeter outlet.

6.10.4.10 What is the oxygen concentration? ___% (>80)

6.10.4.11 Remove the O_2 Med sensor.

6.10.4.12 Close the flowmeter flow control valve.

6.11 Oxygen Analyzer

6.11.1 Disconnect the O_2 sensor cord at the sensor interface panel. The Advisory messages O_2 SENS DISC shall appear on the central alarm display, and a single tone audible alarm shall sound.

6.11.2 Reconnect the O_2 sensor cord.

6.11.3 Touch the O_2 CAL soft key, and select YES in the confirm window. Note: Make sure the sensor is exposed to only 21% O_2 (room air).

(✔) 6.11.4 After calibration is completed, what is the displayed oxygen concentration? ___% (21)

6.11.5 Open the notebook, select Alarms, touch the oxygen NUMERIC box. Is the box highlighted? ___(Y)

6.11.6 Set the O_2 LO alarm limit to 30%.

6.11.7 The Warning message % OXYGEN LOW shall appear on the central alarm display, and a continuous audible alarm shall sound.

6.11.8 Verify that the oxygen LO alarm limit has a range from 18 to 99%.

6.11.9 Set the LO limit to 18.

6.11.10 What is the HI oxygen alarm default? ___ (100)

6.11.11 Touch the SET HI button in the alarm page of the O_2 notebook.

6.11.12 Verify that the oxygen HI alarm limit has a range from 100 to 19%

6.11.13 Set the HI limit to 19.

6.11.14 Expose the O_2 sensor to room air (21% O_2).

6.11.15 The Advisory message % OXYGEN HI shall appear on the central alarm display, and a single tone audible alarm shall sound.

6.11.16 Adjust the HI limit to 100%

(✔) 6.11.17 The INSP O_2 HIGH message shall be extinguished.

6.11.18 Touch the Oxygen Numeric box to close the notebook.

6.11.19 Place the sensor into the valve dome, set the oxygen flow to 10 L/min., select MAN/SPONT on the Divan.

6.11.20 Verify that the APL valve toggle switch is set to MAN and the APL control is set to 30 cm H_2O.

6.11.21 Attach an open 22 mm hose to the inspiratory connector and occlude the Divan bag port with a test terminal (P/N 4104389) and squeeze bulb (P/N S010159).

(✔) 6.11.22 After 3 minutes, what is the oxygen concentration? ___% (97-100)

6.11.23 Close the oxygen flow control valve.

6.12 Oxygen Concentration Tests

6.12.1 Oxygen + Nitrous Oxide Concentration Test

6.12.1.1 Verify that the Divan is in Manual/Spontaneous mode.

6.12.1.2 Verify that the APL valve toggle switch is set to MAN and the APL control is set to 30 cm H_2O.

6.12.1.3 Verify that an open 22 mm hose (P/N 9995112) is attached to the inspiratory connector, and occlude the Divan bag port with a test terminal and squeeze bulb (P/N S010159).

6.12.1.4 Insert a calibrated O_2 sensor into the valve dome adapter on the inspiratory valve.

6.12.1.5 Close all the flow control valves.

6.12.1.6 Open a pipeline supply for each gas.

6.12.1.7 Depress the O_2 Flush for 5 seconds.

6.12.1.8 Set the oxygen flow to 4 L/min.

6.12.1.9 Is the O_2 concentration 97-100% within 3 minutes? ___(Y)

6.12.1.10 Set the nitrous oxide flow to 2 L/min.

(✔) 6.12.1.11 What is the oxygen concentration? ___% (64-70)

6.12.1.12 Close all flow control valves.

6.12.2 Oxygen + Air Concentration Test

6.12.2.1 Depress the O_2 Flush for 5 seconds.

6.12.2.2 Is the O_2 concentration 97-100% within 3 minutes? ___(Y)

6.12.2.3 Set the oxygen flow to 4L/min.

6.12.2.4 Set the air flow to 2 L/min.

(✔) 6.12.2.5 What is the oxygen concentration? ___% (71-77)

6.12.2.6 Close all flow control valves.

6.12.2.7 Close the oxygen flow control valve.

6.13 Oxygen Ratio Control

6.13.1 Depress the O_2 Flush for 5 seconds.

6.13.2 Set the oxygen flow to 1000 mL.

6.13.3 Open the nitrous oxide flow control valve to the stop position.

(✔) 6.13.4 What is the oxygen concentration? ___ % (21-29)

6.13.5 Set the oxygen flow to 1.5 L/min.

(✔) 6.13.6 What is the oxygen concentration? ___ % (21-29)

6.13.7 Set the oxygen flow to 2 L/min.

(✔) 6.13.8 What is the oxygen concentration? ___ % (21-29)

6.13.9 Set the oxygen flow to 4 L/min.

(✔) 6.13.10 What is the oxygen concentration? ___ % (21-29)

6.13.11 Reduce the O_2 flow to 500 mL/min. Verify that the N_2O flow is greater than or equal to 600 mL/min.

6.13.12 Close the oxygen flow control valve.

(✔) 6.13.13 What is the flow of nitrous oxide? ___ (*375-750 mL/min.)

6.13.14 What is the oxygen concentration with the O_2 flow control valve closed? ___ % (>21)

6.13.15 If the machine is configured for Air-Only mode, engage this feature and verify the O2 and N2O flows stop.

6.13.16 Close the nitrous oxide flow control valve.

* Bypass flow specification is given @ 50 psi. Deviation will affect this value.

6.14 Fresh Gas Leak Test

6.14.1 Turn the System Power switch to STANDBY.

6.14.2 Remove the hose connector from the fresh gas inlet of the Divan.

6.14.3 Connect a digital pressure manometer and special Fresh Gas Leak Test Device (P/N 4115041) to the fresh gas hose.

6.14.4 Apply 50 cm H_2O of pressure to the system.

(✔) 6.14.5 After 30 seconds, what is the pressure on the manometer? ___ (>40 cm H_2O)

6.14.6 Turn on the left mounted vaporizer to the first graduated marking.

6.14.7 Apply 50 cm H_2O of pressure to the system.

(✔) 6.14.8 After 30 seconds, what is the pressure on the manometer? ___ (>40 cm H_2O)

6.14.9 Turn off the vaporizer.

6.14.10 Remove the test equipment from the fresh gas outlet.

6.14.11 Turn the System Power switch to ON.

6.14.12 Open the O_2 flow control valve to 5 L/min., purge the system for 5 seconds, then close the O_2 flow control valve.

6.14.13 Turn the System Power switch to STANDBY.

(✔) 6.14.14 If applicable, turn on the right mounted vaporizer to the first graduated marking; repeat Steps 6.14.7 thru 6.14.13. ___ (>40 cm H_2O)

6.14.15 Is the fresh gas outlet labeled correctly? ___(Y)

6.15 Minimum O2 Control Solenoid Test

6.15.1 Turn the System Power switch to ON and close all flow control valves.

6.15.2 If minimum flow is disabled, skip to the next step. If minimum flow is enabled, allow the Divan to begin the self test by following and confirming the prompts. At Divan test Number 8 (as identified in the Breaths/min. window) disconnect the fresh gas hose from the ventilator.

6.15.3 Connect a digital pressure manometer and special Fresh Gas Leak Test Device to the fresh gas outlet.

6.15.4 Apply 50 cm H_2O of pressure to the system.

(✔) 6.15.5 After 30 seconds, what is the pressure on the manometer? ___(<55 cm H_2O)

6.15.6 Remove the manometer and Fresh Gas Leak Test Device.

6.15.7 Reconnect the fresh gas hose to the fresh gas inlet of the Divan.

6.15.8 Press the Manual/Spontaneous button, then press the selection knob on the ventilator control panel to cancel the self test and set to Manual/Spontaneous mode. If the Divan displays COMPLETE TEST, press the ventilator override switch.

6.15.9 Verify that the oxygen flowmeter indicates *150 to 200 mL/min.

* Minimum flow specification is given @ 50 psi. Deviations will affect this value.

6.16 Divan Maintenance

(✔) 6.16.1 Breasy Inspection

6.16.1.1 Remove the O_2 Med sensor from the inspiratory valve dome and examine the two O-rings.

6.16.1.2 Remove the inspiratory and expiratory valve domes and discs.

6.16.1.3 Are any pins on the valve assemblies broken or bent?
Inspiratory ___(N) Expiratory ___(N)

6.16.1.4 Are any pins on the valve domes broken?
Inspiratory ___(N) Expiratory ___(N)

6.16.1.5 Are the valve discs in good condition?
Inspiratory ___(Y) Expiratory ___(Y)

6.16.1.6 Are the valve dome washers in good condition? ___(Y)

6.16.1.7 Reinstall the inspiratory and expiratory valve discs and domes.

6.16.1.8 Check flow sensor connections, O-rings and transducers.

6.16.1.9 Remove the absorbent canister and empty the contents into a suitable container for disposal.

6.16.1.10 Inspect the breasy canister gaskets and the canister for chips or cracks at the top inside sealing surface.

6.16.1.11 Remove the diffuser and verify its chain retainer is secure and undamaged. If the diffuser tube is supplied with a collar above the screen, verify this threaded tube is securely fastened to the base. If the diffuser tube is without a collar, look under the screen and examine the tube solder joint. Verify there is not a crack or gap at the solder joint nor any deformation of these components.

6.16.1.12 Fill the canister with fresh absorbent and reinstall.

(✔) 6.16.2 Divan Component Checks

6.16.2.1 Turn the System Power switch to STANDBY.

6.16.2.2 Inspect and verify that the housing, touch keys, rotary transducer, bumper, and bag mount arm are in good condition.

6.16.2.3 Disconnect all attached hoses, and remove the compact breathing system.

6.16.2.4 Remove the piston assembly.

6.16.2.5 Is the piston assembly easy to remove? ___(Y)

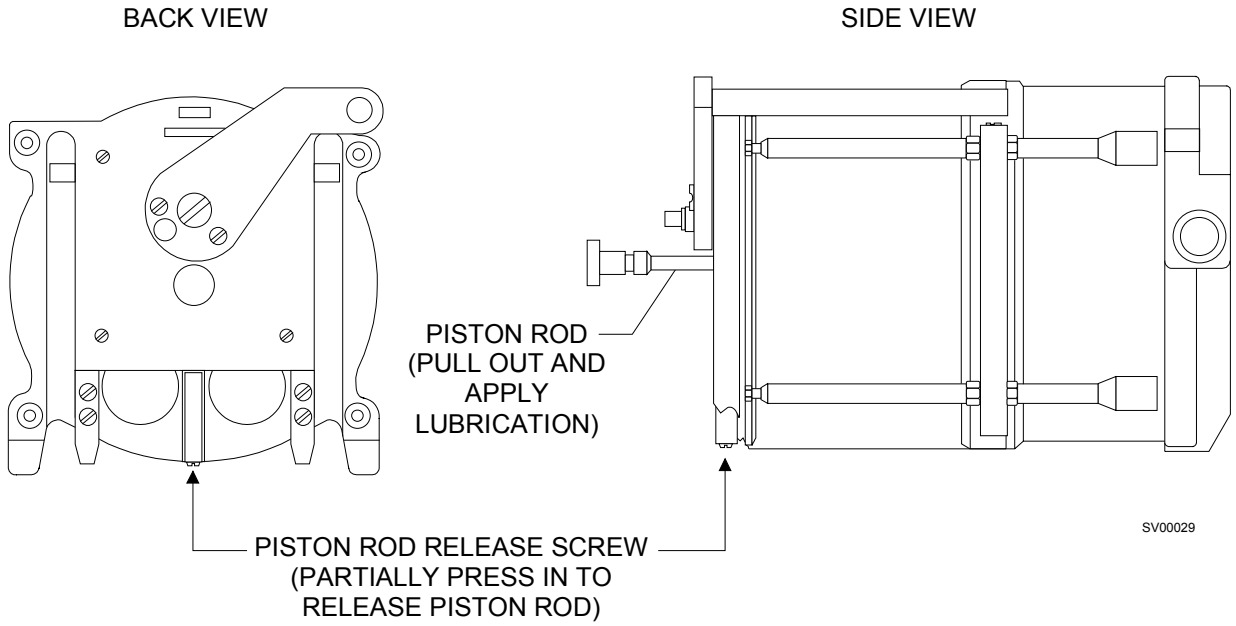
6.16.2.6 Inspect and verify that the compact breathing system and piston assembly are in good condition.

6.16.2.7 Partially press the piston rod release screw, and pull the piston rod out (see illustration).

6.16.2.8 If the rod shows signs of excessive wear, replace the entire piston cylinder unit.

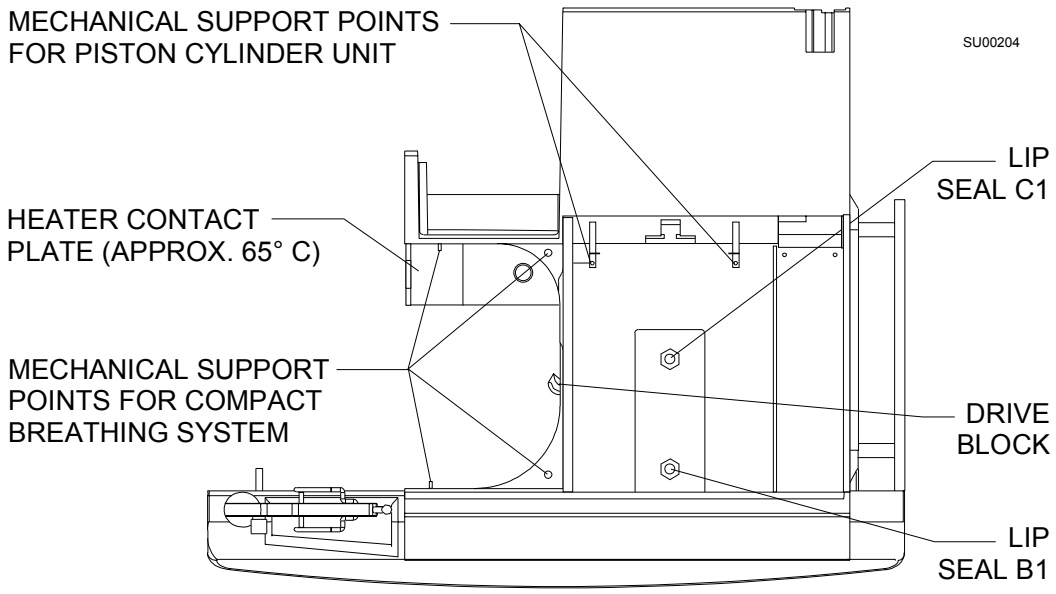
6.16.2.9 Wipe off any old lubricant and wear debris.

6.16.2.10 Apply a thin film of Molykote 55 lubricant (P/N 4115127) to the rod, then return the piston rod to its previous position.



6.16.2.11 Empty the water trap beneath Lip Seal B1 in the Divan chassis using a pipet.

CAUTION: Do not seal off lip seal at outlet, as otherwise vacuum could destroy Pressure Sensor PE2.

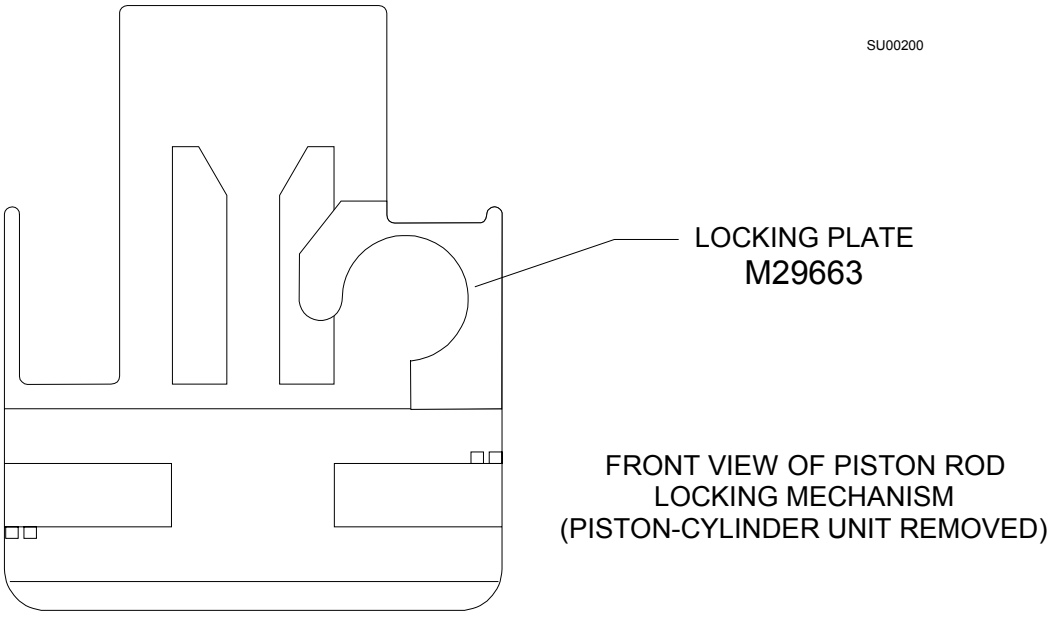

MECHANICAL SUPPORT POINTS FOR PISTON CYLINDER UNIT
SU00204
LIP SEAL C1
HEATER CONTACT PLATE (APPROX. 65° C)
MECHANICAL SUPPORT POINTS FOR COMPACT BREATHING SYSTEM
DRIVE BLOCK
LIP SEAL B1

TOP VIEW OF DIVAN VENTILATOR CHASSIS
(BREATHING SYSTEM AND PISTON-CYLINDER UNIT REMOVED)

6.16.3 Verify that the locking mechanism operates correctly. Lubricate the drive block which moves the breathing system to the pneumatic interface with Molykote 55M.

6.16.4 Are the support points tight? Compact breathing system must be parallel with pneumatic interface and must be horizontal.

6.16.5 Locking plate M29663 or rod locking mechanism must not be bent.



6.16.6 CPU 1 Battery Check:

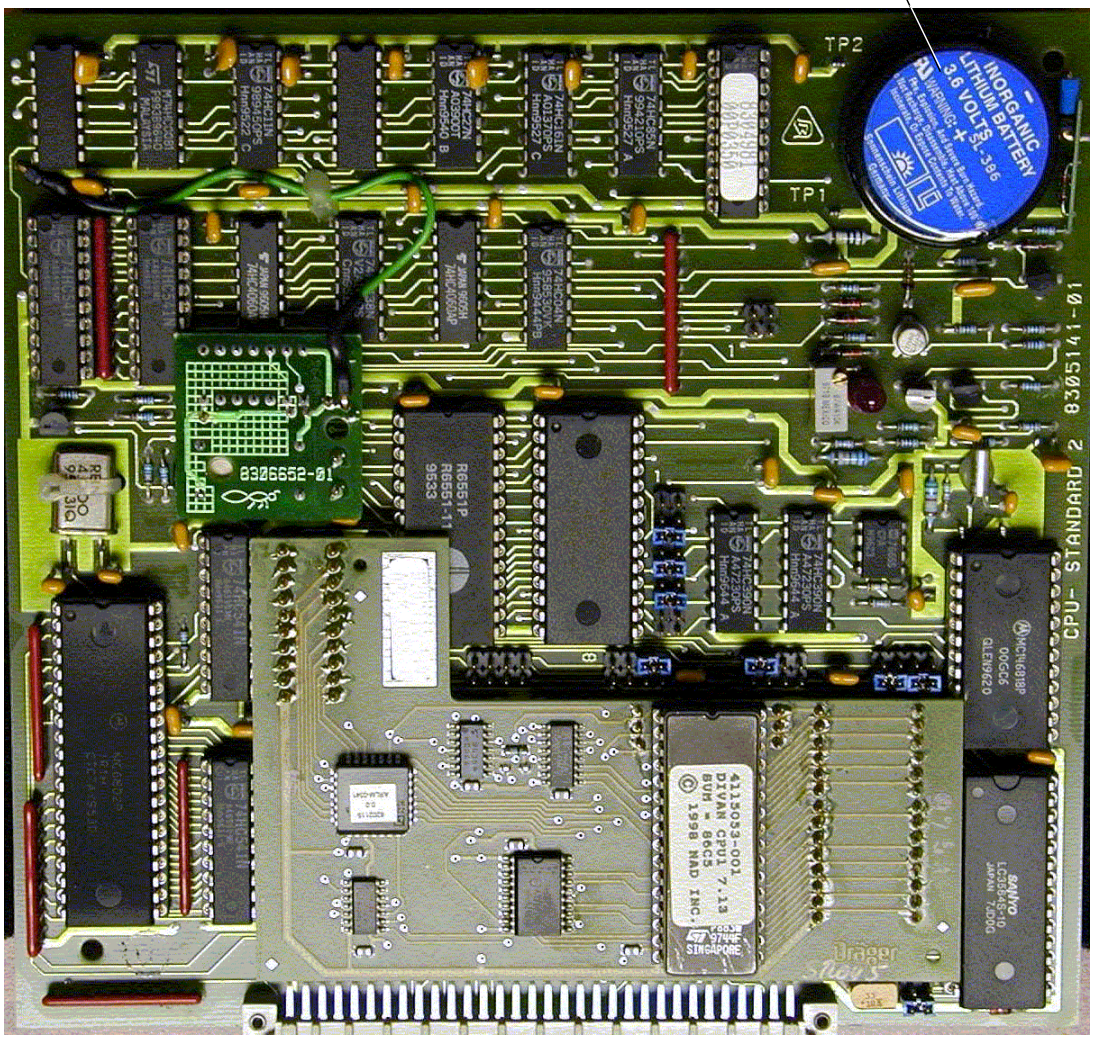
6.16.6.1 Remove the two screws securing the PCB cover plate Lift out the plate and board retainer.

6.16.6.2 Remove the CPU 1 board. Locate the lithium battery on the CPU 1 board. See illustration.

6.16.6.3 If the battery does not have a “Replace By...” label, the required replacement interval must be established. Refer to Servce Procedure SP00206, Lithium Battery Replacement.

If the battery has a label and the date printed on the label is less than three months from the current date, replace the battery. Refer to Service Procedure SP00206.

6.16.6.4 Reinstall the board retainer and PCB cover plate.


LITHIUM BATTERY
TP2
TP1
INORGANIC LITHIUM BATTERY 3.6 VOLTS
8306652-01
CPU- STANDARD 2 8305141-01

CPU 1 BOARD

(✔) 6.16.7 Breathing System Heater Check:

6.16.7.1 Verify (after several minutes) that the heater contact surface is cool.

WARNING: The temperature of the breathing system heater may be as high as approximately 65° C.

6.16.7.2 Turn the System Power switch to ON.

6.16.7.3 Press down on the heating contact surface with your hand.

6.16.7.4 Verify that the temperature slowly increases.

6.16.7.5 Remove the pressure from the heating contact surface.

6.16.7.6 Verify that the heater switches off and the surface returns to its original position.

6.16.7.7 Turn the System Power switch to STANDBY.

6.17 Divan Service Mode

(✔) 6.17.1 Pressure Sensor Zero Calibration

NOTE: The compact breathing system and piston cylinder unit must be removed from the Divan during these tests.

6.17.1.1 Start the Divan in the Service Mode by pressing the left pad of the STANDBY button and the pad above it, while turning the System Power switch to ON.

6.17.1.2 Turn the knob to display CONFIG VALVES, and press the knob.

6.17.1.3 Press the PEEP button on the control panel to vent control pressure.

6.17.1.4 Press the knob.

6.17.1.5 Turn the knob to display A/D CONVERTER, and press the knob.

6.17.1.6 Verify that the CHANNEL 0 (PE1) display shows a decimal value (left side of numeric display) between 506 and 717.

6.17.1.7 Turn the knob to select Channel 1 (PE2).

6.17.1.8 Verify that the CHANNEL 1 display shows a decimal value (left side of numeric display) between 506 and 717.

6.17.1.9 Press the knob to exit the function.

(✔) 6.17.2 Pressure Sensor Linearity Test

6.17.2.1 Turn the knob to select 'CALIB SENSORS?' and press the knob to perform the calibration. Display should then indicate SENSOR CALIB! and then return to CALIB SENSORS?.

6.17.2.2 Turn the knob to select CONFIG VALVES and press the knob. Display should indicate xxx000000.

6.17.2.3 Press the knob to exit the function.

6.17.2.4 Turn the knob to select DISP. PRESS. VAL. and press the knob. The display shows xxxx yyyy zzzz where:

xxxx indicates PE1 pressure (Airway)

yyyy indicates PE2 pressure (Piston)

zzzz indicates PE3 pressure (Control)

in 1/10 cm H_2O.

6.17.2.5 Airway pressure display should indicate 0 ±2 cm H_2O.

6.17.2.6 Install the piston and compact breathing system, and restore the breathing system connections. Set the APL to 30 cm H_2O.

6.17.2.7 Remove the bag hose from the telescoping pole and connect it to the Y-piece.

6.17.2.8 Disconnect the gas sample return line from its port on the breathing system and connect a test pressure meter and GAP return adapter (P/N 4115040) to the port.

6.17.2.9 Open the air or oxygen flow control valve so that the pressure can build up and APL enters working range.

Readjust APL valve if necessary to maintain 30 cm H_2O on the test pressure meter.

6.17.2.10 Verify that PE1 and PE2 displays do not differ by more than 3 cm H_2O.

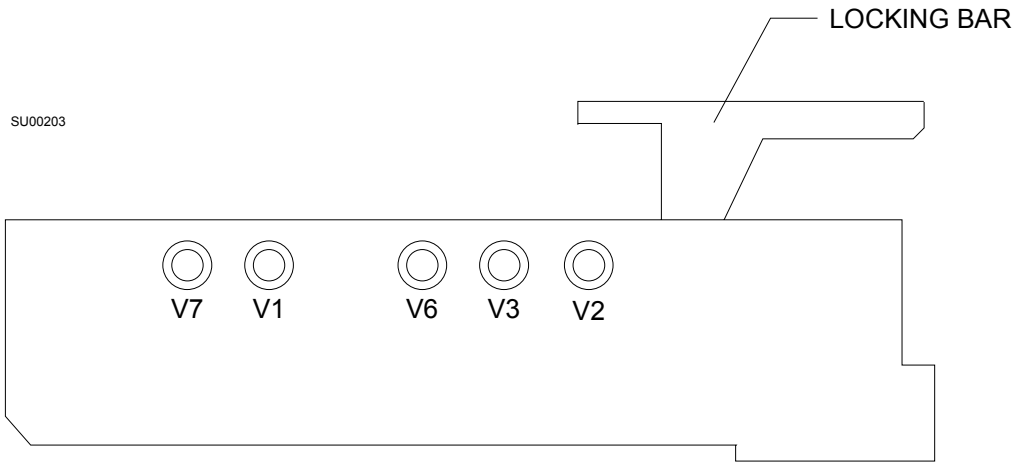
6.17.2.11 Remove the test equipment

(✔) 6.17.3 PE3 Sensor and Control Pressure Check

6.17.3.1 Remove the compact breathing system.

6.17.3.2 Occlude the V2 and V7 ports.

6.17.3.3 Divan display should indicate 870 ±40 for PE3.



BREATHING SYSTEM PNEUMATIC INTERFACE
(VIEW FROM LEFT SIDE WITH BREATHING SYSTEM REMOVED)

(✔) 6.17.4 Secondary Control Pressure Test

6.17.4.1 Install the compact breathing system, and restore the breathing system connections.

6.17.4.2 Press and turn the knob to display CONFIG VALVES. Press the knob.

6.17.4.3 Press the RATE button.

6.17.4.4 Press the knob to exit the function.

6.17.4.5 Turn the knob to select DISP. PRESS. VAL., and press the knob.

6.17.4.6 Display should indicate that PE3 = 870 ±100.

NOTE: If test fails, check breathing system diaphragm integrity at location Y2. Also verify 1.5 bar ventilator supply pressure, 2 L/min ventilator flow, and 87 mbar control pressure. Refer to Sections 4.14, 5.9, 5.10 and 5.11.

6.17.5 Operating Hours

(✔) 6.17.5.1 Press and turn the knob to display TOTAL HOURS. Press the knob and record the hours shown on the 7-segment display for VT and Rate.

6.17.5.2 Press the knob to exit the function.

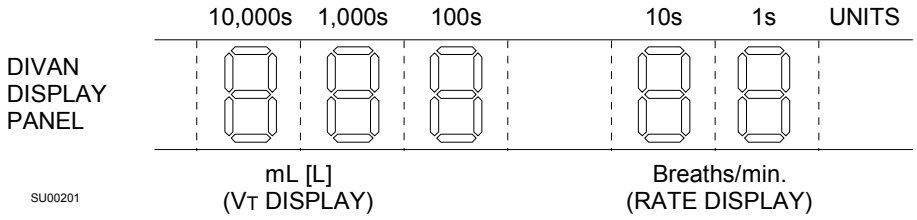
(✔) 6.17.5.3 Turn the knob to display OPERATING HOURS. Press the knob and record the hours shown on the 7-segment display for VT and Rate.

NOTE: Zeroes are not displayed but must be included in the calculation.

6.17.5.4 Press the knob to exit the function.

NOTE: The Divan has two elapsed-time meters. “TOTAL HOURS” summates the operating hours while the machine is on (thus also the standby times). “OPERATING HOURS” only summates the operating hours when not in Standby Mode.

Pay attention to significance of digit positions! Zeroes are sometimes presented as a dark field on Rate display.



(✔) 6.17.6 Error Log

6.17.6.1 Turn the knob to display LOGBOOK and press the knob.

6.17.6.2 Review the last ten logbook entries.

NOTE: Address area of logbook $0000 to $004F most recent error can be found at address [0000].[0000] xxx yyH (xxx error in decimal form, yy error in hexadecimal form).

Logbook is deleted at end of PMS. Otherwise, the subsequent tests would produce several “091 5BH” entries.

6.17.7 Confirm Mode Verification

6.17.7.1 Turn the knob to display “Confirm mode”.

6.17.7.2 Press the knob and scroll to display “Confirm R-knob”, then press the knob.

6.17.7.3 Exit the function by turning the knob.

6.17.8 Power Up Default Settings

6.17.8.1 Turn the rotary knob to display “Select Parameter”, then press the knob to confirm selection. The display will then indicate Default Settings.

6.17.8.2 Referring to the following chart, touch each key to display the current default value. If a parameter requires adjustment, rotate the knob to set the correct value:

Parameter	Setting
Pmax	25 @ Software Version 7.13
Pmax	30 @ Software Version 7.40
I:E	1.0 : 2.0

6.17.8.3 Press the rotary knob twice to exit the function.

6.17.9 Secondary Vacuum Relief Valve - if applicable

6.17.9.1 Turn the knbo to display “conf. valves” and press the knob.

6.17.9.2 Press the Pmax and Vt keys. Display should indicate “xxx110000”.

6.17.9.3 Connect a test terminal (P/N 4104389) to the patient circuit Y-piece. Connect a suction squeeze bulb (such as a Riken aspirator) to the test terminal.

6.17.9.4 Connect a GAP Return adapter (P/N 4115040) to the Breasy’s GAP exhaust return port. Connect a calibrated test pressure meter to the GAP Return adapter.

6.17.9.5 Squeeze the suction bulb several times to develop a working pressure.

6.17.9.6 Verify a pressure of -25 to -45 cmH2O is displayed on the test pressure meter.

6.17.9.7 Remove the test equipment and connect the Y-piece t the 15mm test plug.

6.17.9.8 Turn the System Power switch to STANDBY.

6.17.9.9 Turn the System Power to ON. Press the Divan Standby key and wait for the system to complete its self diagnostic tests.

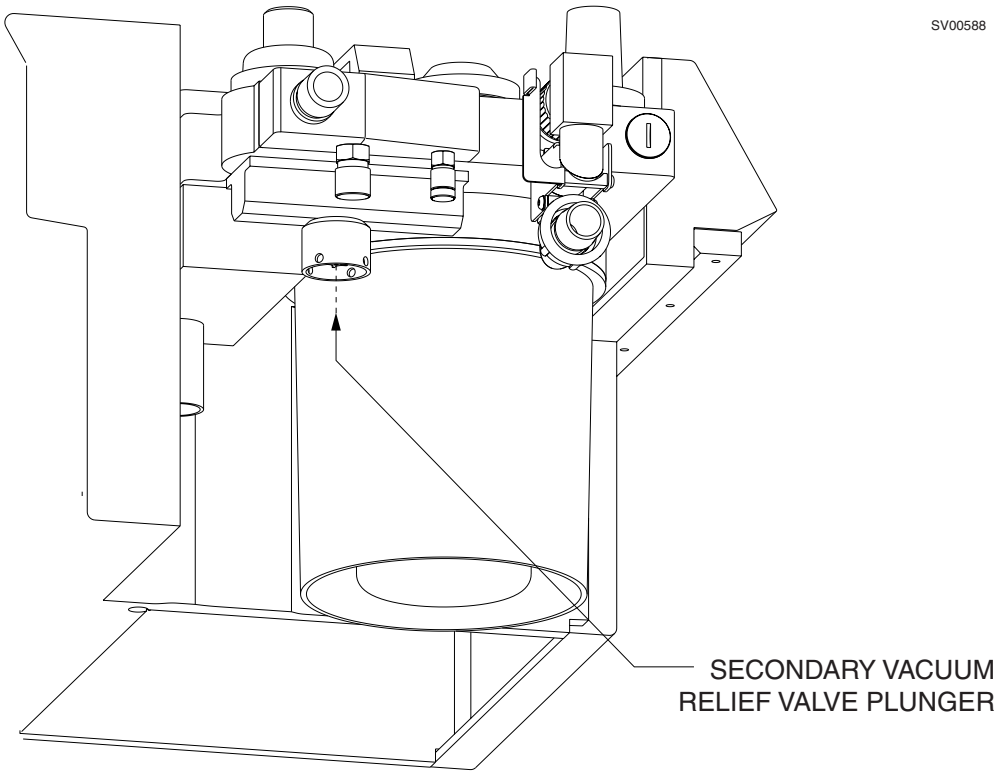
6.17.9.10 Set the Divan to Manual/Spont mode.

6.17.9.11 Adjust the fresh gas flow to 10 L/min.

6.17.9.12 Build up a test pressure of approximately 30 cmH2O.

6.17.9.13 Depress the Secondary Vacuum Relief Valve's plunger and verify that the NM6000 monitor pressure waveform immediately drops to Zero.

6.17.9.14 Turn the System Power switch to STANDBY.



6.18 Divan Operating Mode Tests

(✔) 6.18.1 Emergency Cold Start Test

6.18.1.1 Install a patient breathing circuit with a test lung (P/N 4115128) attached to the Y-piece.

6.18.1.2 Verify that the System Power switch has been at STANDBY until the Divan display blanks out, then wait 10 seconds.

6.18.1.3 Turn the System Power switch to ON.

6.18.1.4 Press the Volume Mode button, then press the knob to confirm. When VOLUME MODE is displayed, press the knob.

6.18.1.5 Verify that the ventilator starts mechanical ventilation within 30 seconds.

- If COMPLETE TEST is displayed, turn the System Power switch to STANDBY and wait for 10 seconds.
- Turn the System Power switch to ON and follow operator prompts on control panel to successfully complete the self test.
- Turn the System Power switch to STANDBY, wait 10 seconds, and then repeat the Emergency Cold Start Test.

(✔) 6.18.2 Ventilator Override Test

6.18.2.1 Lift the guard on the ventilator override switch, press and hold the button until the LED indicator lights.

6.18.2.2 Verify that manual ventilation can be performed with the breathing bag.

6.18.2.3 Turn the System Power switch to STANDBY.

6.18.3 Power Up Self Test

6.18.3.1 Turn the System Power switch to ON.

(✔) 6.18.3.2 Follow the operator prompts on the control panel to successfully complete the Divan self test.

(✔) 6.18.3.3 Verify that the leak rate is ≤100 mL/min.

(✔) 6.18.4 Leak and Compliance Test

6.18.4.1 Press and hold the TEST button for approximately 3 seconds.

6.18.4.2 Verify that the Divan returns to Standby, indicating that the test is successfully completed.

(✔) 6.18.5 APL Valve Test

6.18.5.1 Connect a test terminal (P/N 4104389) and pressure gauge to the bag connector using the PDM adapter (P/N 4115038).

6.18.5.2 Connect a breathing circuit and occlude the Y-piece.

6.18.5.3 Verify that the APL toggle switch is set to MAN.

6.18.5.4 Set the APL control to 70 cm H_2O.

6.18.5.5 Verify that the System Power switch is ON.

6.18.5.6 Set the Divan to Manual/Spontaneous mode, and press the knob.

6.18.5.7 Set the fresh gas flow to 10 L/min. of O_2.

6.18.5.8 Is the pressure between 56 and 88 cm H_2O? ___(Y)

6.18.5.9 Set the APL control to 10 cm H_2O.

6.18.5.10 Is the pressure between 5 and 15 cm H_2O? ___(Y)

6.18.5.11 Set the APL control to 30 cm H_2O.

6.18.5.12 Is the pressure between 24 and 36 cm H_2O? ___(Y)

6.18.5.13 Close the O_2 flow control valve.

6.18.5.14 Remove all test equipment.

6.18.6 Expiration Valve Leak Test

6.18.6.1 Verify that the APL valve is set to Manual mode and adjusted to 30 cm H_2O.

6.18.6.2 Interconnect a hose between the Divan bag port and the inspiratory valve.

6.18.6.3 Disconnect the gas pod return line from its port on the breathing system if applicable. Connect a test pressure meter to the port using the GAP return adapter (P/N 4115040).

6.18.6.4 Connect a test terminal (P/N 4104389) to the expiratory valve port on the flow sensor.

6.18.6.5 Connect a Capnomed flowmeter (P/N S000081) to the test terminal.

6.18.6.6 Verify that the System Power switch is ON and the ventilator is in Manual/Spont mode. Turn up the oxygen flow until the system pressurizes to 30 cm H_2O.

(✔) 6.18.6.7 Verify that the value indicated on the test flowmeter is ≤60 mL/min.

6.18.6.8 Remove all test equipment.

6.18.7 Inspiratory Valve Leak Test

6.18.7.1 Interconnect a hose between the Divan bag port and the expiratory port on the flow sensor.

6.18.7.2 Connect a fresh gas leak test adapter (P/N 4115041) and calibrated pressure meter to the test terminal (P/N 4104383). Connect the test terminal to the inspiratory valve.

6.18.7.3 Connect a Capnomed flowmeter (P/N S000081) to the Qdisc male fresh gas test (P/N M31581) connector (ref. Page 6-2E), and attach a fresh gas male test connector to the fresh gas port of the breasy.

6.18.7.4 Verify the Divan is in Manual/Spont. mode.

6.18.7.5 Pressurize the inspiratory limb to 30 cm H_2O.

(✔) 6.18.7.6 Verify that the value indicated on the test flowmeter is ≤60 mL/min.

6.18.7.7 Remove all test equipment, reconnect the fresh gas hose and flow sensor

(✔) 6.18.8 Flow Direction Test

6.18.8.1 Connect a breathing circuit with a Siemens test lung (P/N 4115128) at the Y-piece.

6.18.8.2 Attach a bag to the bag hose.

6.18.8.3 Set the oxygen flow to 3 L/min.

6.18.8.4 Inflate the simulated lung by briefly using the O_2 Flush.

6.18.8.5 Squeeze the breathing bag attached to the bag hose at a rate of approximately 10 BPM. Readjust the APL valve if required to properly ventilate the simulated lung.

6.18.8.6 Observe the operation of each unidirectional valve disc at eye level and make sure that the inspiratory valve disc raises only during the inspiration phase, and the expiratory valve raises only during the exhalation phase. Watch the valves until satisfied that both valves operate correctly, and move freely without sticking.

WARNING: To ensure proper direction of gas flow during inspiratory and expiratory phases, the disks in the inspiratory and expiratory valves must move freely, without sticking.

(✔) 6.18.9 Volume Ventilation Test

6.18.9.1 Set the fresh gas flow to 3 L/min.

6.18.9.2 Set Pmax to 40 cm H_2O.

6.18.9.3 Set the Tidal Volume to 400 mL.

6.18.9.4 Set the Rate to 12/min.

6.18.9.5 Set the %IP to 0.

6.18.9.6 Press the VOLUME button, and verify “Volume Mode?” text message is displayed.

6.18.9.7 Press the knob to confirm.

6.18.9.8 Verify that the ventilator performs mechanical ventilation.

6.18.9.9 Verify that the ventilator does not make any scraping, humming or creaking noises. Refer to Troubleshooting Guide 14 for additional information

(✔) 6.18.10 PEEP Test

6.18.10.1 Continue volume ventilation with conditions from the previous test.

6.18.10.2 Verify that PEEP = 0 +2 on workstation monitor. Press the knob.

6.18.10.3 Increase PEEP to 10 cm H_2O.

6.18.10.4 Verify that PEEP = 10 ±2 cm H_2O on workstation monitor.

6.18.10.5 Increase PEEP to 20 cm H_2O. Press the knob.

6.18.10.6 Verify that PEEP = 20 ±3 cm H_2O on workstation monitor.

6.18.10.7 Set PEEP to 0 cm H_2O. Press the knob.

(✔) 6.18.11 Pressure Ventilation Test

6.18.11.1 Continue ventilation with conditions from previous test.

6.18.11.2 Press the Pres Mode button, and verify “Pressure Mode?” text message is displayed.

6.18.11.3 Press knob to confirm.

6.18.11.4 Verify that ventilator continues to perform mechanical ventilation.

6.18.11.5 Verify that the indicator in the upper left corner of the Press Mode button is now illuminated.

(✔) 6.18.12 SIMV Ventilation Test

6.18.12.1 Continue ventilation with conditions from previous test.

6.18.12.2 Press the SIMV button, and verify “SIMV Mode?” text message is displayed.

6.18.12.3 Press knob to confirm.

6.18.12.4 Press the SIMV Rate button and set SIMV Rate to 6/min. Press the knob to confirm.

6.18.12.5 Start a stopwatch on commencement of inspiration.

6.18.12.6 Generate a shallow negative trigger pulse with test lung after 8 seconds. (Apply four 1x4 in. strips of doublesided tape between the test lung case and the bag.)

6.18.12.7 Verify that a synchronized inspiration stroke is triggered.

(✔) 6.18.13 Manual Ventilator Test

6.18.13.1 Press the Manual/Spontaneous button, and verify “Manual/Spont.?” text message is displayed.

6.18.13.2 Press the knob to confirm.

6.18.13.3 Connect a Siemens test lung.

6.18.13.4 Set the fresh gas flow to 3 L/min.

6.18.13.5 Set the APL valve to MAN.

6.18.13.6 Verify that manual ventilation can be implemented with the breathing bag.

(✔) 6.18.14 Spontaneous Breathing Test

6.18.14.1 Set the APL valve to SPONT.

6.18.14.2 Verify that spontaneous breathing can be implemented with the test lung.

6.19 Respiratory Volume

6.19.1 Touch the VOLUME numbox. Is the box highlighted? ___(Y)

6.19.2 Select the Alarms tab. What is the LO MIN VOL alarm default? ___(1.0)

6.19.3 Verify that the MIN VOL has a LO alarm limit range from 0.2 to 10.0 by increments of 0.1.

6.19.4 Remove the flow sensor from the breathing circuit, and set the Divan to Volume Mode.

6.19.5 Adjust the LO MIN VOL alarm to 2.0 liters.

6.19.6 Set the volume alarm to OFF.

6.19.7 Touch the volume ALARMS ON to enable the volume alarms and start a stopwatch.

(✔) 6.19.8 What is the time when the APNEA-VOL is activated on the central alarm display as a CAUTION? ___sec (13-17)

6.19.9 Verify that the MIN VOL LOW message appears as a CAUTION.

(✔) 6.19.10 What is the time when the APNEA-VOL is activated on the central alarm display as a WARNING? ___sec (26-34)

6.19.11 Set the ventilator to Volume Mode.

6.19.12 Set the frequency to 6.

6.19.13 Set the I:E Ratio to 1:2.

6.19.14 Set the oxygen flow to 2 L/min.

6.19.15 Set the Tidal Volume to 200 mL.

6.19.16 Reattach the flow sensor, and attach a patient circuit to the absorber system.

6.19.17 After the first breath is detected, does the APNEA-VOL WARNING deactivate? ___(Y)

(✔) 6.19.18 Within one (1) minute, does the MIN VOL LOW message appear as a CAUTION? ___(Y)

6.19.19 Adjust the LO alarm limit 0.1 liter below the indicated minute volume.

6.19.20 Does the MIN VOL LOW CAUTION deactivate? ___(Y)

6.19.21 Increase the tidal volume to 1000 mL and Pmax to 80 cm H_2O.

6.19.22 Install a 33mm x 22mm adapter (P/N 4115087) onto each test volumeter port.

6.19.23 Disconnect the 22mm hose at the flow sensor, and attach it to the adapter at the top of the volumeter.

6.19.24 Connect a 22mm x 12 inch hose (P/N 9995112) between the flow sensor and the connection at the bottom of the test volumeter.

6.19.25 Press the Standby key. Press the knob to confirm. Disconnect the test lung and occlude the Y-piece.

6.19.26 Press the TEST key on the Divan to calculate the additional hose compliance. Reattach test lung to the patient circuit and return the Divan to Volume Mode operation.

(✔) 6.19.27 Is the TID VOL on the test volumeter within 15% of the Divan Vt setting? ___(Y)

6.19.28 Create a reverse flow by removing the flow sensor and lightly blowing through it in the reverse direction.

(✔) 6.19.29 Each time a reverse flow of greater than 20 mL is detected, does the REVERSE FLOW message appear as an ADVISORY? ___(Y)

6.19.30 Reinstall the flow sensor.

6.19.31 Disconnect the respiratory volume sensor from the VOLUME SENSOR interface.

6.19.32 Does the VOL SEN DISC message appear in the ADVISORY column? ___(Y)

6.19.33 Reconnect the volume sensor to the VOLUME SENSOR interface.

6.19.34 Put the Divan ventilator in standby mode.

6.19.35 Remove the test equipment.

6.20 Pressure Monitor

6.20.1 Apnea Pressure Test

6.20.1.1 Disconnect the breathing pressure pilot line from the NM6000 monitor interface.

6.20.1.2 Zero a calibrated pressure meter to ambient air pressure.

6.20.1.3 Connect the pressure monitor adapter (P/N 4115043) to a calibrated pressure meter and attach to NM6000 monitor interface. Readjust the pressure to zero.

6.20.1.4 Bring up the Pressure notebook on the screen; press the setup tab and set the Apnea threshold to 8 cm.

6.20.1.5 Simultaneously set the ventilator Volume Mode and start a stopwatch.

(✔) 6.20.1.6 What is the time when APNEA PRESSURE appears on the alarm display as a CAUTION? ___sec. (13-17)

(✔) 6.20.1.7 What is the time when APNEA PRESSURE appears on the alarm display as a WARNING? ___sec. (26-34)

(✔) 6.20.1.8 Slowly increase the test pressure. At what pressure does the APNEA PRRESSURE alarm deactivate? ___cmH_2O (7-9)

6.20.1.9 Press the ventilator Standby button, and verify “Standby?” text message is displayed.

6.20.1.10 Press knob to confirm.

6.20.2 Continuing Pressure Alarm Test

6.20.2.1 Increase the test pressure above the threshold line shown on the display, and begin timing with a stopwatch.

(✔) 6.20.2.2 What is the time when CONTINUOUS PRES appears as a warning? ___sec (13-17)

(✔) 6.20.2.3 Decrease the pressure slowly. What is the pressure at which the CONTINUOUS PRES alarm deactivates? ___cmH_2O (7-9)

6.20.3 High Pressure Alarm Test

6.20.3.1 Select the Alarms tab. Verify that the HIGH PRESSURE alarm is set at 50 cm H_2O.

(✔) 6.20.3.2 Slowly increase the test pressure. At what pressure does a VENT PRESS HI alarm activate as a warning? ___cmH_2O (47-53)

6.20.4 Sub-Atmospheric Pressure Alarm Test

6.20.4.1 Slowly create a sub-atmospheric test pressure.

(✔) 6.20.4.2 At what pressure does the SUB ATM PRES warning alarm activate? ___cmH_2O (-7 to -13)

(✔) 6.20.5 Alarm Circuit Delay Test

6.20.5.1 Create any “Warning Alarm” condition.

6.20.5.2 Press the ALARM SILENCE button located in the alarm box.

6.20.5.3 Verify that the audio portion of the alarm is silenced.

6.20.5.4 Verify that a 60 appears at the bottom of the alarm box.

6.20.5.5 Press the ALARM SILENCE twice.

6.20.5.6 Verify that a 120 appears at the bottom of the alarm box.

6.20.5.7 Press the Setup softkey and select the Setup tab.

6.20.5.8 Press the Test Primary Speakers key to access the System Setup Notebook and verify that the primary speaker tests passed.

6.20.5.9 Press the Test Backup Speaker key and verify that the backup speaker test passed.

6.20.5.10 Press the Setup softkey to close the System Setup Notebook.

6.20.5.11 Remove test equipment and reconnect the breathing pressure pilot line to the NM6000 monitor interface.

6.21 Agent Analyzer Accuracy Test

NOTE: Before performing the accuracy test, the GAP must be in the full accuracy mode. The Agent warm-up messages shall not appear on the advisory display.

NOTE: During normal operation a GAP will enter full accuracy mode within 20 minutes. However, because the GAP's CO2 monitoring power-up default is in Standby mode, the unit will remain in hibernation and thus report Agent warm-up for longer than 20 minutes if it does not detect a CO2 measurement. Applying verification gas, or breathing into the sample line will force a zero calibration and update the GAP's warm-up status.

NOTE: Before performing the accuracy test, the oxygen analyzer must display 21% FIO_2. The oxygen sensor must be exposed to ambient air during the entire GAP accuracy testing.

6.21.1 Sample Flow Test

6.21.1.1 Verify that an oxygen supply is connected to the machine.

6.21.1.2 Examine the sample circuit consisting of the airway adapter/ filter, sample line, semi-permeable tube, and water trap container. Replace any components as needed.

6.21.1.3 Connect a capnomed flowmeter test stand (P/N S000081) to a gas sample line, using a Luer lock fitting (P/N 4110709) and thread sealant in the port at the top of the capnomed flowmeter.

6.21.1.3A Touch the CO2 numbox and adjust the slider bar to max flow.

(✔) 6.21.1.4 What is the sample flow rate? ___mL/min. (175 to 225)

6.21.2 Line Block Test

6.21.2.1 Continue using the configuration from the previous test.

6.21.2.2 Attach the hose at the lower port of the capnomed flowmeter test stand to the hose barb on the auxiliary O2 flowmeter.

6.21.2.3 Turn the auxiliary O2 flowmeter flow control valve clockwise until the capnomed flowmeter indicates 75 mL/min.

(✔) 6.21.2.4 Verify that a CO_2 LINE BLOCK message appears on the monitor in approximately 15 seconds.

6.21.2.5 Remove the test equipment, and close the auxiliary O2 flow control valve.

6.21.2.6 Verify that the LINE BLOCK message has cleared.

6.21.3 Accuracy Test

NOTE: Before performing the accuracy test, the vaporizers must be exposed to a constant temperature (preferably 22° C) for at least one hour.

6.21.3.1 Attach the CO_2 calibration adapter assembly (P/N 4110216) to the CO_2 calibration cylinder (P/N 4107979). Attach the sample line to the Luer connector on the cal adapter.

6.21.3.2 Turn the flow control valve on the calibration adapter slightly counter-clockwise.

(✔) 6.21.3.3 After one minute, verify that the MEAN CO_2 display indicates within 4.8% to 5.2% or 36.0 to 40.0 mmHg.

6.21.3.4 Verify that the MEAN AGENT on the agent display indicates within 0 to 0.4% or blank to indicate no valid agent reading.

(✔) 6.21.3.5 Verify that the MEAN N_2O indicates within 32.0 to 38.0%

6.21.3.6 Turn off the flow and remove the sample line from the calibration adapter.

6.21.3.7 Ensure that all vaporizer handwheels are set to their zero, or OFF position.

6.21.3.8 Fill each vaporizer to be tested with the correct anesthetic agent until the liquid level is within the correct range as indicated on the sight glass. DO NOT OVER FILL.

6.21.3.9 Calibrate a Riken gas analyzer as per manufacturer's instructions.

6.21.3.10 Connect a Riken test adapter to the inspiratory port of the breathing system. Connect an airway adapter with a Luer fitting (P/N 4108104) to the Riken test adapter.

6.21.3.11 Connect the scavenger hose to the airway adapter, and connect the Riken gas analyzer and GAP sample line to the test adapter.

6.21.3.12 Remove the 22 mm hose and occlude the Divan bag port with a test terminal and squeeze bulb (P/N S010159).

6.21.3.13 Set the Divan to Manual/Spont. mode and press the knob. Verify that the APL toggle is set to Man, and adjust for 30 cm H_2O.

6.21.3.14 Set the oxygen flow to 10 L/min. to flush the system of residual gases.

6.21.3.15 Reduce the oxygen flow to 4.0 L/min. Use 5.0 L/min. if testing a desflurane vaporizer.

6.21.3.16 Slowly adjust a vaporizer to the 1.0% volume concentration, and wait five minutes for the vaporizer to stabilize.

(✔) 6.21.3.17 Multiply the current reading on the Riken gas analyzer by the appropriate conversion factor from the table at the end of this procedure, and record the result. Verify the vaporizer concentration is within the allowable ranges. Indicate Pass/Fail on the report.

6.21.3.18 Verify that the MEAN AGENT value is within the 8% of tolerances of the vaporizer and the Riken gas analyzer.

6.21.3.19 Slowly adjust the vaporizer to 2.5% volume concentration, and wait for the vaporizer to stabilize.

6.21.3.20 Repeat Steps 6.21.3.17 and 6.21.3.18.

6.21.3.21 Slowly adjust the vaporizer to 4.0% volume concentration, and wait for the vaporizer to stabilize.

6.21.3.22 Repeat Steps 6.21.3.17 and 6.21.3.18.

6.21.3.23 Turn the vaporizer OFF.

(✔) 6.21.3.24 Repeat Steps 6.21.3.14 thru 6.21.3.23 for the other vaporizers (including the one mounted in the rear storage position, if applicable).

NOTE: If any reading is outside of the GAP tolerance limits, the GAP must be replaced, and then this test procedure must be repeated.

6.21.3.25 Remove the test equipment and reconnect the scavenger hose and patient circuit to the Divan.

ANESTHETIC AGENT	VAPORIZER SETTINGS AND ALLOWABLE RANGES			CONVERSION FACTORS	
	1%	2.5%	4%	Riken Model 18H	Riken Model 1802D
Halothane	0.92 to 1.28	2.30 to 3.20	3.58 to 5.02	x 1.0	x 0.74
Enflurane	0.87 to 1.33	2.175 to 3.325	3.38 to 5.22	x 1.08	x 0.80
Isoflurane	0.92 to 1.28	2.30 to 3.20	3.58 to 5.02	x 1.05	x 0.78
Sevoflurane	0.87 to 1.33	2.175 to 3.325	3.38 to 5.22	x 1.09	x 0.81

Desflurane w/ Riken 1802D	4%	6%	10%	12%	16%
	3.2 to 4.8	4.9 to 7.1	8.2 to 11.8	9.8 to 14.2	13.1 to 18.9

6.22 O2 Flush Valve

6.22.1 Disconnect the nitrous oxide pipeline hose and close the cylinder valve (if applicable).

6.22.2 Set the oxygen flow rate to 5 L/min.

6.22.3 Open the nitrous oxide flow control valve to its counter-clockwise stop.

6.22.4 After the nitrous oxide flow stops, close the nitrous oxide flow control valve.

6.22.5 Close the oxygen flow control valve.

6.22.6 Disconnect any additional pipeline hoses and close all cylinder valves except oxygen (if applicable).

6.22.7 Bleed the pressure from the Air gas circuit.

6.22.8 Press and release the O_2 Flush button.

6.22.9 Does the flow of oxygen stop immediately? ___(Y)

6.22.10 Using a volumeter adapter (P/N 4115042), connect a test minute volumeter to the fresh gas hose.

6.22.11 Press the O_2 Flush button.

(✔) 6.22.12 What is the oxygen flush flow rate? ___ L/min.(45-65)

6.22.13 Remove the test volumeter and adapter. Reconnect the fresh gas hose.

6.22.14 Insert a calibrated O_2 sensor into the inspiratory valve dome.

6.22.15 Press the O_2 Flush button.

(✔) 6.22.16 What is the O_2 concentration? ___ $\%O_2$ (97-100)

6.22.17 Remove the O_2 sensor from the valve dome.

6.22.18 Close the oxygen cylinder valve.

6.22.19 Bleed pressure from the O_2 circuit by pressing the O_2 Flush button.

(✔) **6.23 Reset Logbook**

6.23.1 Turn the System Power switch to STANDBY.

CAUTION: Use ESD precautions (P/N S000095) when handling the PCB assemblies. Static discharge can damage components on these assemblies.

6.23.2 Set the 3rd DIP switch on the ADDA PCB to the down position.

6.23.3 Start the Divan in the Service Mode by pressing and holding the left pad of the Standby button and the pad above it while turning the System Power switch to ON.

6.23.4 Press the knob.

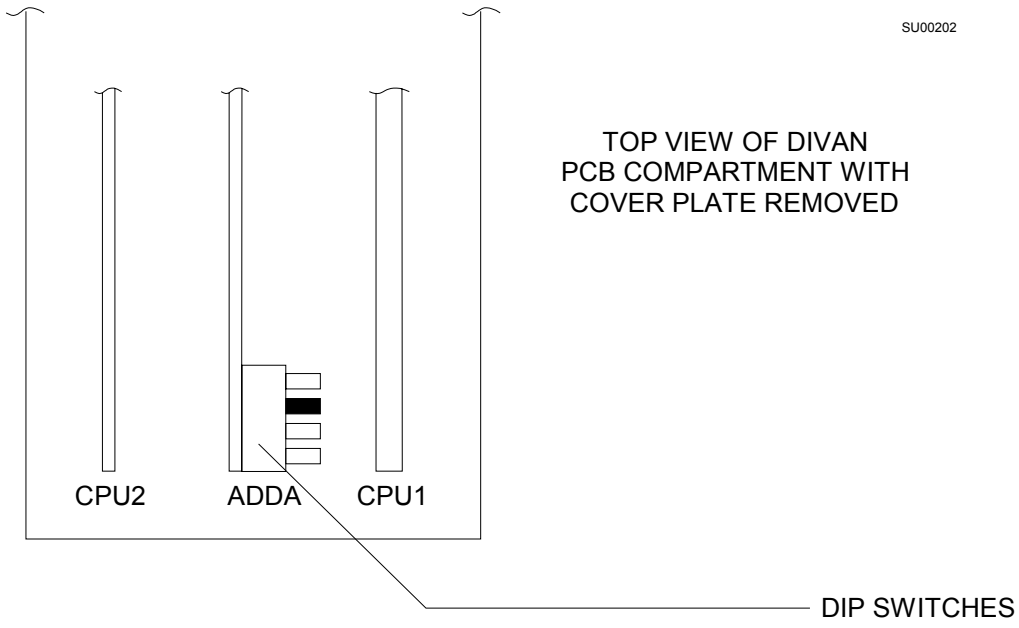
6.23.5 Turn the knob to display LOGBOOK, and press the knob.

6.23.6 Press the Pmax key to reset the display to [0000] 000 00 H.

6.23.7 Return the 3rd DIP switch to its original (up) position.

6.23.8 Turn the System Power switch to STANDBY.

6.23.9 Replace the PCB cover plate and secure it with the screws that were previously removed.



6.24 Electrical Safety

(✔) 6.24.1 Protective Ground Continuity

NOTE: Do not plug the safety analyzer power cord into a line isolation monitor, as inaccurate readings may occur.

6.24.1.1 Plug the unit into the safety analyzer, and plug the power cord of the safety analyzer into a 120 V receptacle.

6.24.1.2 Turn on the safety analyzer and set the function switch to the GROUND WIRE RESISTANCE position. Attach the test lead to the SINGLE LEAD connector.

6.24.1.3 Set the safety analyzer GROUND switch to the NORMAL position. Set the POLARITY switch to the OFF position.

6.24.1.4 The safety analyzer shall indicate 0.1 ohms or less with its test lead applied to the following points:

--Cylinder yoke
--Side rail handle
--Convenience outlet ground socket

(✔) 6.24.2 Convenience Outlet and Auxiliary Outlet Strip

NOTE: This test will check the convenience outlets and auxiliary strip outlets for fault conditions such as open ground (>31Ω), reverse polarity, open line and open neutral. This is done each time the BIOTECH 501 PRO is powered up and allowed to cycle through its self test.

6.24.2.1 Shut off and unplug the safety analyzer. Remove the anesthesia machine plug from the analyzer, and plug it into the same outlet that was being used by the analyzer.

6.24.2.2 Plug the safety analyzer into the first convenience outlet to be tested, and turn the analyzer power switch ON. Allow the analyzer to cycle through its Auto Test sequence. If no fault is indicated, shut off the analyzer.

6.24.2.3 Shut off and unplug the safety analyzer.

6.24.3 Chassis Leakage Current Test

NOTE: Do not plug the safety analyzer power cord into a line isolation monitor, as inaccurate readings may occur.

6.24.3.1 Unplug the NM6000 and plug it into the safety analyzer. Plug the power cord of the safety analyzer into a 120 V receptacle and turn it on.

6.24.3.2 Set the safety analyzer to the CHASSIS LEAKAGE CURRENT position.

6.24.3.3 Attach the safety analyzer test lead to a cylinder yoke.

(✔) 6.24.3.4 Record the total leakage current with the polarity and ground switches set to the following positions:

Ground	Polarity
Open	Normal
Normal	Normal
Open	Reversed
Normal	Reversed

Verify that the leakage current is 250 microamps or less in each of the switch positions.

6.24.3.5 Turn off and disconnect the safety analyzer.

(✔) 6.25 Vapor Exclusion System

6.25.1 Set both vapors to zero. Move exclusion lever to the far right. *Does the lever properly engage without binding? ___(Y)

6.25.2 Is it possible to turn on the right position vapor? ___(N)

6.25.3 Move exclusion lever to the far left. *Does the lever properly engage without binding? ___(Y)

6.25.4 Is it possible to turn on the left position vapor? ___(N)

* Refer to Section 3.3, Troubleshooting Guide 12.

(✔) 6.26 Table Top Lamp

Verify that both table top lamps are functional.

(✔) 6.27 Flowmeter Lights

Verify that the flowmeter lights are illuminated.

(✔) 6.28 CRT Fan

Verify that air is flowing from the vent slots on the rear panel behind the CRT. NOTE: There is no fan on machines with a flat panel display.

(✔) 6.29 Operator's Instruction Manual

Verify that the availability/location of the machine's Operator's Instruction Manual (including Integrated Patient Monitor if applicable) is in close proximity of the machine.

(✔) 6.30 Final Check

6.30.1 Restore all connections to the patient interface panel.

6.30.2 Verify that the pipeline hoses are connected to the hospital pipeline outlets.

6.30.3 Verify that the O_2 sensor is removed from the inspiratory valve dome.

6.30.4 Verify that the inspiratory valve dome is plugged.

6.30.5 Verify that the machine is plugged into a live outlet.

6.30.6 Press and hold the Divan TEST button for 3 seconds. Verify that the Divan completes a leak and compliance test and returns to Standby, indicating that the test is successfully completed.

6.30.7 Verify the correct date and time on the Narkomed 6000 main display screen.

6.30.8 Return all machine controls and settings to their original state.

6A.0 Test Procedure for the Integrated Patient Monitor

The following pages contain the PMC procedures for the Integrated Patient Monitoring Module. The purpose of the PMC procedure is to provide service personnel with a method that can be used to verify operational and functional performance of the monitor. Failure to attain any of the listed results indicates a potential malfunction of the monitor.

The procedures in this section shall be performed in their entirety at initial installation, during all scheduled periodic maintenance certification (PMC) visits, and each time a Integrated Patient Monitoring Module is removed, replaced, calibrated or adjusted. A PMC Checklist form, P/N 4116820, available from the Draeger Medical, Inc. Technical Service Department, shall be completed by the Technical Service Representative each time a PMC is performed.The section numbers on the checklist form are keyed to paragraph numbers in this manual. Steps in the procedure marked with (✔) require a response at the corresponding line on the checklist form.

The PMC procedure is based on the assumption that the Integrated Patient Monitoring Module being tested is used with known good cables and test equipment. It also requires that the user be somewhat familiar with the operation of all test equipment required for the PMC procedure. For more information concerning operation of these components, refer to the respective operator manual.

Test Equipment Required:

Test equipment listed with an asterisk (*) requires calibration at a maximum interval of one year. Verify the dates on test equipment calibration labels. DO NOT USE any test equipment having an expired calibration date. Notify your supervisor immediately if any equipment is found to be out of calibration.

In the space provided at the bottom of the checklist form, record the Model and ID number of all calibrated test equipment used.

The following table lists the test equipment, adapters, and cables necessary to successfully complete the PMC procedure. The PMC procedure was written for the test equipment in the following table. If test equipment other than the manufacturer’s recommendation is used, it may be necessary to slightly modify some test steps.

MARQUETTE TEST EQUIPMENT for INTEGRATED PATIENT MONITORING MODULE				
Description	Part #	Qty	Vendor	Notes
* Electrical Safety Analyzer, Biotek 501 Pro or equiv.		1	Biotek	Can also be obtained locally
* Multifunction Patient Simulator Kit (see note below)	4117115	1	DMI	Marquette #MARQ II Kit
* SPO2 Simulator	4117116	1	DMI	Marquette #408610-001

MARQUETTE MATERIALS for INTEGRATED PATIENT MONITORING MODULE				
Description	Part #	Qty	Vendor	Notes
ECG 5-Leadwire Set	4113274	1	DMI	
ECG Cable, 5-leadwire, AHA	4113273	1	DMI	
NIBP Adult Cuff	4113395-004	1	DMI	
NIBP Interface Cable	4113454	1	DMI	
NIBP Test Adapter	4116111	1	DMI	
SPO2 Finger Probe	4113823	1	DMI	
SPO2 Interface Cable	4113453	1	DMI	
Blood Pressure Cable Adapter (Amp to Nicolay) Pigtail	4117117	4	DMI	Marquette #700095-001
Cardiac Output Cable Adapter (Amp to Nicolay) Pigtail	4117118	1	DMI	Marquette #700092-001
Marq-II Blood Pressure Cable	4117119	4	DMI	Marquette #5183072
Marq-II Carrying Case	4117120	1	DMI	Marquette #6770042
Marq-II Temperature Cable Y.S.I. 400	4117121	2	DMI	Marquette #5183001
SPO2 Adapter Cable	4117123	1	DMI	Marquette #700232
Defib Sync Connector	4117114	1	DMI	

MARQUETTE TEST MATERIALS for STRIP CHART RECORDER				
Description	Part #	Qty	Vendor	Notes
Chart Paper	4110335	1	DMI	

* Requires calibration at a maximum interval of one year.

NOTE: Multifunction Patient Simulator kit includes:
1 ea Carrying case
1 ea Multifunction Simulator
1 ea Cardiac Output module
2 ea Blood Pressure cable
1 ea Temp cable: YSI 400
1 ea Temp cable: YSI 700

6A.1 Electrical Safety Analysis

NOTE: Do not plug the safety analyzer power cord into a line isolation monitor, as inaccurate readings may occur.

6A.1.1 Lead Isolation Factor:

6A.1.1.1 Disconnect the ECG cable from the Integrated Patient Monitoring Module interface.

NOTE: Reference your Safety Analyzer operator manual for specific operations to perform these tests.

6A.1.1.2 Connect the power cord of the safety analyzer to an AC receptacle.

6A.1.1.3 Connect the power cord of the unit under test to the safety analyzer.

6A.1.1.4 Connect the ECG cable (P/N 4113273) to the 5-lead set (P/N 4113274) and connect the leads to the safety analyzer, but do not connect the cable to the Integrated Patient Monitoring Module.

6A.1.1.5 Set the safety analyzer Power Switch to ON. Turn the System Power switch to ON.

6A.1.1.6 Set the safety analyzer to measure ECG leakage current.

6A.1.1.7 Select for all leads to be tested (ALL - GND).

CAUTION: During this testing, DO NOT touch the ECG posts.

6A.1.1.8 Press and hold the ISOLATION key.

(✔) 6A.1.1.9 Record the reading from the display (referred to as the Lead Isolation Factor) on the test report.

6A.1.1.10 Release the ISOLATION key.

6A.1.2 Patient source leakage:

This test checks leakage current from the ECG connector of the monitor relative to ground.

6A.1.2.1 Connect the ECG cable to the ECG connector of the monitor.

(✔) 6A.1.2.2 Record the total leakage current with the Polarity and Ground switches set to the following positions:

Ground	Polarity
Open	Normal
Normal	Normal
Open	Reversed
Normal	Reversed

Verify that the leakage current is 10 microamps or less in each of the switch positions.

6A.1.3 Patient sink leakage:

This tests patient cable leakage current from a 115 VAC source into the ECG connector of the monitor.

6A.1.3.1 Set power switch on the safety analyzer to ON.

6A.1.3.2 Set the safety analyzer switches as follows:

- Ground switch - NORM,
- Polarity switch - NORM,
- Select ECG leakage (ALL - GND).

WARNING: The following step will cause high voltage (115 VAC) to appear at the ECG JACK on the safety analyzer. Do not touch the ECG Jack posts or ECG lead clips during this test as an electrical shock will occur.

(✔) 6A.1.3.3 Press and hold the ISOLATION key. Read leakage current indicated on safety analyzer. Release the ISOLATION key. Subtract the lead isolation factor recorded earlier from this value.

If the sum of the readings is greater than 10 µA and the monitor is operating at 115 V/60 Hz, the unit under test fails this test and should be repaired and tested again.

6A.1.3.4 Change the safety analyzer polarity switch to the REV POL position.

(✔) 6A.1.3.5 Press and hold the ISOLATION key. Read leakage current indicated on safety analyzer. Release the ISOLATION key. Subtract the lead isolation factor recorded earlier from this value.

If the sum of the readings is greater than 10 µA and the monitor is operating at 115 V/60 Hz, the unit under test fails this test and should be repaired and tested again.

6A.1.3.6 Set the power switch on the safety analyzer to OFF.

6A.1.3.7 Disconnect all test equipment from the Integrated Patient Monitoring Module. Disconnect the machine power cord plug from the safety analyzer power receptacle. Disconnect the safety analyzer from the wall receptacle. Plug the machine's power cord back into the machine.

6A.2 ECG tests

Touch the Set Up key, select the Traces tab. Note the current selection for future reference. For software versions ≤ 2.06 select 8 WFs; 3 IBP channels; 5 Lead ECG. For software versions ≥ 3.00 select Automatic mode.

NOTE: Cycle patient multi-parameter simulator (P/N 4117115) to restore unit to power up default values.

6A.2.1 Turn on the patient multi parameter simulator and enter Code “1” to select a normal sinus rhythm. Verify the simulator displays:

- Heart rate - 80 bpm,
- Heart rate amplitude - 1.0 mV,

6A.2.2 Connect the 5 ECG leads to the outside row of color coded terminals at the top of the simulator as follows: RA = wht, RL = grn, V1 = brn LA = blk, LL = red

6A.2.3 Connect the ECG cable to the Integrated Patient Monitoring Module interface.

If software version is ≤ 2.06, touch the SpO2 window to open the SpO2 notebook. Toggle the SpO2 tone to Off, then close the SpO2 notebook.

6A.2.4 Touch the HR window to open the HR notebook. Select the Setup tab and toggle the QRS tones to ON. Select the Volume tab and adjust the arrow Up and Down keys on the Integrated Patient Monitoring Module interface to verify that the audio tone is adjustable. Move the slider and verify that the audio tone is adjustable. Return the slider tab to its midpoint.

6A.2.5 Select the Site Scale tab. Touch the ECG Channel #1 key. Select Lead II. Touch the Scale key and select 1.0x.

(✔) 6A.2.6 Verify the following:

- ECG lead II is displayed and is noise-free,
- Heart rate of 80 ± 5 bpm is displayed,
- An audible tone sounds with each R-wave (QRS complex).

(✔) 6A.2.7 Verify Channel 1 I, II, III, aVR, aVL, aVF; Channel 2 I, II, III, V, aVR ECG leads are available for viewing and are noise-free. Return lead selection to Lead II. NOTE: The same lead can not be used on both channels at the same time.

6A.2.8 Touch the Scale key and toggle through all 5 scales. Verify they are available and increase or decrease the size of the waveform. Return the scale to 1.0x

6A.2.9 Touch the HR Alarms tab and note all HR alarm parameters.

6A.2.10 Toggle the Alarm control to ON.

(✔) 6A.2.11 Raise the Heart Rate Limit Set Lo alarm above the actual value. Verify HRT RATE LOW appears as a Warning. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.2.12 Lower the Heart Rate Set Hi below the actual value. Verify HRT RATE HI appears as a Caution. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.2.13 Enter Code “3” and use the simulator’s increment key to adjust the simulator heart rate amplitude to 2.0 mV. Enter Code “110” to set the simulator’s Pace to Asynchronous Pacemaker rate.

NOTE: Touch the Relearn key if ‘astol’ is displayed.

Touch the ECG setup tab and toggle the Pace Pulse to Normal.

Observe the following while viewing ECG leads II, III, aVR, aVF, and V:

- a **P** appears above to the right of the heart icon indicating pacemaker pulse detection is enabled, and
- the heart rate still reads 75 ± 5 bpm.

6A.2.14 Disable the monitor's pacemaker pulse detection and return the simulator to these conditions by entering Code "1" for NSR and Code "3" decrement to 1.0 mV. Verify the simulator displays:

- Heart rate - 80 bpm,
- Heart rate amplitude - 1.0 mV,

6A.2.15 Select ECG lead II for viewing in the top trace position on the monitor display.

6A.2.16 Disconnect the RA leadwire from the patient simulator.

(✔) 6A.2.17 Observe following:

- a ECG RA DISC message appears on the alarm display.

6A.2.18 Reconnect the RA leadwire to the patient simulator, and the alarm shall cease.

(✔) 6A.2.19 Touch the ECG Setup tab and touch the Relearn key. Verify that Relearn in Progress is displayed for a short while, and then the heart rate information appears.

6A.3 Battery Operation

6A.3.1 Disconnect the system power cord plug from the wall receptacle.

6A.3.2 Verify the message AC POWER FAIL appears on the central monitor display. If the software version is ≥ 3.00, acknowlege the AC Power Fail Warning by pressing OK.

6A.3.3 Enter Code "1" on the patient simulator to select a normal sinus rhythm:

- ECG heart rate - 80 bpm,
- ECG amplitude - 1.0 mV,

(✔) 6A.3.4 Observe the following:

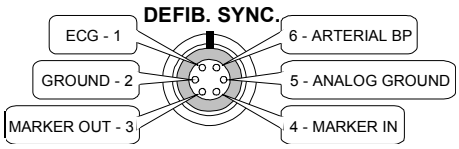
- ECG Lead II is displayed and is noise-free,
- Heart rate of 80 ± 5 bpm is displayed,
- With QRS Volumes enabled, an audible tone sounds with each R-Wave.

6A.3.5 Verify all seven ECG lead sites are selectable for display on the monitor and are noise free.

6A.3.6 Connect the power cord plug to the wall receptacle.

6A.4 Defibrillator synchronization tests

6A.4.1 Use the following figure as a reference for connecting the shunt to the DEFIB SYNC connector, located on the front panel of the monitor, for performing this test.

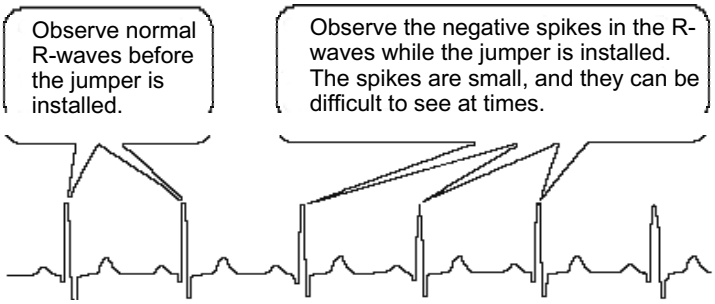


6A.4.2 Enter Code “1” on the Patient Simulator to select a normal sinus rhythm of:

- ECG heart rate 80 BPM
- ECG amplitude 1.0 mV

Defibrillator synchronization tests Verify markers

(✔) 6A.4.3 Attach a defib sync shunt connector jumper wire or defib sync connector (P/N 4117114) between pin-3 (Marker Out) and pin-4 tests (Marker In) of the DEFIB SYNC connector located on the front of the monitor. Verify white colored negative spikes in each of the QRS Complex (ECG waveform) R-Waves on the monitor display, similar to those shown in the illustration below.


Observe normal R-waves before the jumper is installed.
Observe the negative spikes in the R-waves while the jumper is installed. The spikes are small, and they can be difficult to see at times.

Defibrillator synchronization tests completion:

6A.4.4 Remove the jumper wire or defib sync connector installed in the previous step, from the DEFIB SYNC connector. This completes the defibrillator synchronization tests.

(✔) 6A.5 ST Segment Analysis

6A.5.1 Touch ST Segment to open the ST Segment window.

6A.5.2 Enter Code “145” and use the simulator’s increment key to raise the ST Elevation to +0.1 mV. Verify lead II indicates a positive value.

6A.5.3 Use the simulator’s decrement key to lower the ST Depression to -0.1 mV. Verify the lead II indicates a negative value.

6A.5.4 Enter Code “1” on the Patient Simulator to select a normal sinus rhythym.

6A.5.5 Touch the ST Parameter box to close the ST Segment window.

6A.6 Invasive blood pressure

NOTE: This monitor's invasive blood pressure sensitivity is calibrated to 5µV/V1 mmHg.

6A.6.1 Enter Code "132 to calibrate the simulator's invasive monitor sensitivity to 5µV/V1 mmHg.

6A.6.2 BP1 connector (ART) tests:

6A.6.2.1 Connect the BP simulator cable (P/N 4117119) to BP cable adapter P/N 4117117) and connect the BP1 connector of the patient simulator to the BP1 connector of the Integrated Patient Monitoring Module. Repeat this procedure for BP2 and BP3. Also repeat this procedure for BP4 if software version is ≥3.00.

6A.6.2.2 Press the ZERO ALL push-button on the front panel of the monitor interface and verify a green LED illuminates for several seconds.

6A.6.2.3 Touch the BP1 window (located 3nd from the top) to open the P1 notebook. Touch the Setup tab. Verify that the filter frequency is set to 12. Verify that transducer calibration is set to 1.00.

6A.6.2.4 Touch the Site Scale tab. Touch the Site Selection key and verify all 8 site selections can be selected. Return the site selection to ART.

6A.6.2.5 Touch the Set Scale High key.Verify that you can toggle 20 - 300. Return to 180 scale.

6A.6.2.6 Verify that horizontal cursor can be toggled on and off. Return cursor to the original position.

6A.6.2.7 Enter Code "60" to adjust the simulator BP1 setting to 120/80.

(✔) 6A.6.2.8 Verify the ART 1 parameter window, waveform label, and waveform appear on the display.

6A.6.2.9 Touch the Alarms tab.

6A.6.2.10 Toggle the Alarm control to ON.

6A.6.2.11 Toggle the Pressure key to select SYS.

(✔) 6A.6.2.12 Raise the Sys Set Lo alarm above the actual value. Verify that ART 1 SYS LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.2.13 Lower the Sys Set Hi alarm above the actual value. Verify that ART 1 SYS HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

6A.6.2.14 Touch the Pressure key and toggle to Dias.

(✔) 6A.6.2.15 Raise the Dias Set Lo alarm above the actual value. Verify that ART 1 DIAS LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.2.16 Lower the Dias Set Hi alarm above the actual value. Verify that ART 1 DIAS HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

6A.6.2.17 Touch the Pressure key and toggle to Mean.

(✔) 6A.6.2.18 Raise the Mean Set Lo alarm above the actual value. Verify that ART 1 MEAN LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.2.19 Lower the Mean Set Hi alarm above the actual value. Verify that ART 1 MEAN HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.2.20 Observe a distortion-free ART 1 BP waveform and a reading of approximately 120/80 (93) mm Hg in the ART 1 parameter window on the monitor display.

6A.6.2.21 Enter Code “9” and use the arrow keys to change the patient simulator BP1 (ART 1) output to 240 mmHg.

(✔) 6A.6.2.22 Observe a reading of 240/240 (240) ± 10 mmHg in the ART 1 parameter window on the monitor display.

NOTE: With software version ≤ 2.06, BP2 and BP3 are only available on 8 waveform display. BP4 is not used. With software version ≥ 3.00 IBP cables must be connected before corresponding IBP parameter box appears.

6A.6.3 BP2 connector (CVP2) tests:

6A.6.3.1 Touch the BP2 (CVP2) window (located 4th from the top) to open the P2 CVP Setup notebook. Touch the Setup tab. Verify that the filter frequency is set to 12. Verify that transducer calibration is set to 1.00.

6A.6.3.2 Touch the Site Scale tab. Touch the Site Selection key and verify all 8 site selections can be selected. Return the site selection to CVP.

6A.6.3.3 Touch the Set Scale High key.Verify that you can toggle 20 - 300. Return to 30 scale.

6A.6.3.4 Verify that horizontal cursor can be toggled on and off. Return cursor to the original position.

6A.6.3.5 Enter Code “60” to adjust the simulator CVP2 setting to 25/10.

(✔) 6A.6.3.6 Verify the CVP2 parameter window, waveform label, and waveform appear on the display.

6A.6.3.7 Touch the Alarms tab.

6A.6.3.8 Toggle the Alarm control to ON.

(✔) 6A.6.3.9 Raise the Mean Set Lo alarm above the actual value. Verify that CVP2 MEAN LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.3.10 Lower the Mean Set Hi alarm above the actual value. Verify that CVP2 MEAN HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.3.11 Observe a distortion-free CVP2 BP waveform and a reading of approximately (15) mm Hg in the CVP2 parameter window on the monitor display.

6A.6.3.12 Enter Code “9” and use the arrow keys to change the patient simulator BP2 (CVP2) output to 150 mmHg.

(✔) 6A.6.3.13 Observe a reading of (150) ± 6 mmHg in the CVP2 parameter window on the monitor display.

6A.6.4 BP3 connector (PA3) tests:

6A.6.4.1 Touch the BP3 (PA3) window (located 5th from the top) to open the P3 PA Setup notebook. Touch the Setup tab. Verify that the filter frequency is set to 12. Verify that transducer calibration is set to 1.00.

6A.6.4.2 Touch the Site Scale tab. Touch the Site Selection key and verify all 8 site selections can be selected. Return the site selection to PA.

6A.6.4.3 Touch the Set Scale High key.Verify that you can toggle 20 - 300. Return to 180 scale.

6A.6.4.4 Verify that horizontal cursor can be toggled on and off. Return cursor to the original position.

6A.6.4.5 Enter Code “60” to adjust the simulator BP3 setting to 120/00.

(✔) 6A.6.4.6 Verify the parameter window, waveform label, and waveform appear on the display.

6A.6.4.7 Touch the Alarms tab.

6A.6.4.8 Toggle the Alarm control to ON.

6A.6.4.9 Toggle the Pressure key to select SYS.

(✔) 6A.6.4.10 Raise the Sys Set Lo alarm above the actual value. Verify that PA3 SYSTOLIC LO appears as a Caution, and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.4.11 Lower the Sys Set Hi alarm above the actual value. Verify that PA3 SYSTOLIC HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

6A.6.4.12 Touch the Pressure key and toggle to Dias.

(✔) 6A.6.4.13 Raise the Dias Set Lo alarm above the actual value. Verify that PA3 DIAS LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.4.14 Lower the Dias Set Hi alarm above the actual value. Verify that PA3 DIAS HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

6A.6.4.15 Touch the Pressure key and toggle to Mean.

(✔) 6A.6.4.16 Raise the Mean Set Lo alarm above the actual value. Verify that PA3 MEAN LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.4.17 Lower the Mean Set Hi alarm above the actual value. Verify that PA3 MEAN HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.4.18 Observe a distortion-free PA3 BP waveform and a reading of approximately 120/00 (60) mm Hg in the PA3 parameter window on the monitor display.

6A.6.4.19 Enter Code “9” and use the arrow keys to change the patient simulator BP3 (PA3) output to 60 mmHg.

(✔) 6A.6.4.20 Observe a reading of 60/60 (60) ± 3 mmHg in the PA3 parameter window on the monitor display.

6A.6.5 BP4 connector (FEM4) tests: if applicable

6A.6.5.1 Touch the BP4 (FEM4) window (located 6th from the top) to open the P4 FEM Setup notebook. Touch the Setup tab. Verify that the filter frequency is set to 12. Verify that transducer calibration is set to 1.00.

6A.6.5.2 Touch the Site Scale tab. Touch the Site Selection key and verify all 8 site selections can be selected. Return the site selection to FEM.

6A.6.5.3 Touch the Set Scale High key.Verify that you can toggle 20 - 300. Set the scale to 60.

6A.6.5.4 Verify that horizontal cursor can be toggled on and off. Return cursor to the original position.

6A.6.5.5 Enter Code “89” to adjust the simulator BP4 setting to SWANGAN MAN=RA.

(✔) 6A.6.5.6 Verify the parameter window, waveform label, and waveform appear on the display.

6A.6.5.7 Touch the Alarms tab.

6A.6.5.8 Toggle the Alarm control to ON.

6A.6.5.9 Toggle the Pressure key to select SYS.

(✔) 6A.6.5.10 Raise the Sys Set Lo alarm above the actual value. Verify that FEM4 SYSTOLIC LO appears as a Caution, and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.5.11 Lower the Sys Set Hi alarm above the actual value. Verify that FEM4 SYSTOLIC HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

6A.6.5.12 Touch the Pressure key and toggle to Dias.

(✔) 6A.6.5.13 Raise the Dias Set Lo alarm above the actual value. Verify that FEM4 DIAS LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.5.14 Lower the Dias Set Hi alarm above the actual value. Verify that FEM4 DIAS HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

6A.6.5.15 Touch the Pressure key and toggle to Mean.

(✔) 6A.6.5.16 Raise the Mean Set Lo alarm above the actual value. Verify that FEM4 MEAN LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.5.17 Lower the Mean Set Hi alarm above the actual value. Verify that FEM4 MEAN HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original position.

(✔) 6A.6.5.18 Observe a distortion-free PA4 BP waveform and a reading of approximately 15/10 (12) mm Hg in the FEM4 parameter window on the monitor display.

6A.6.5.19 Enter Code “9” and use the arrow keys to change the patient simulator BP3 (PA3) output to 60 mmHg. NOTE: Channel P4 values are equal to P3 values.

(✔) 6A.6.5.20 Observe a reading of 60/60 (60) ± 3 mmHg in the FEM4 parameter window on the monitor display.

6A.7 Temperature tests:

NOTE: Accuracy for temperature simulation is valid only when the ambient operating temperature is in the 65 to 75° F range.

6A.7.1 Temperature 1

6A.7.1.1 Enter Code 191 to adjust simulator for a temperature output of 37°C.

6A.7.1.2 Attach the 400 series temperature adaptor cable (Draeger P/N 4117121) (Marquette P/N 5183001) to the C.O./Temp port of the simulator and connect the other end to the T1 connector of the Integrated Patient Monitoring Module.

NOTE: Do not use 700 series temp adapter cable (Draeger P/N 4117122) (Marquette P/N 5183002) for testing.

(✔) 6A.7.1.3 Verify a TEMP parameter window appears on the monitor display with a T1 reading of 37.0° ±0.2° C.

6A.7.1.4 Touch the Temp window to open the Temp notebook.Touch the Alarms tab. Toggle the Alarm control to ON. Toggle the Alarm Limits channel selection key to T1. Note the T1 high and low alarm settings.

(✔) 6A.7.1.5 Select Set Lo, raise the Temp 1 low alarm limit above the actual temperature. The Caution message TEMP 1 LOW shall appear on the central alarm display and an intermittent audible alarm shall sound. Readjust the alarm below the actual value. The alarm shall cease. Return the T1 Set Lo alarm to its previous setting.

(✔) 6A.7.1.6 Decrease the T1 set high alarm limit below the actual temperature. The Caution message TEMP 1 HIGH shall appear on the central alarm display and an intermittent audible alarm shall sound. Readjust the alarm above the actual value. The alarm shall cease. Return the T1 Set High alarm to its previous setting.

6A.7.2 Temperature 2

6A.7.2.1 Move the temperature simulator cable from the T1 connector of the Integrated Patient Monitoring Module to the T2 connector of the Integrated Patient Monitoring Module.

(✔) 6A.7.2.2 Verify a T2 reading of 37.0° ±0.2° C in the TEMP parameter window on the monitor display.

6A.7.2.3 Toggle the Alarm Limits channel selection key to T2. Note the T2 high and low alarm settings.

(✔) 6A.7.2.4 Select Set Lo, raise the Temp 2 low alarm limit above the actual temperature. The Caution message TEMP 2 LOW shall appear on the central alarm display and an intermittent audible alarm shall sound. Readjust the alarm below the actual value. The alarm shall cease. Return the T2 Set Lo alarm to its previous setting.

(✔) 6A.7.2.5 Decrease the T2 set high alarm limit below the actual temperature. The Caution message TEMP 2 HIGH shall appear on the central alarm display and an intermittent audible alarm shall sound. Readjust the alarm above the actual value. The alarm shall cease. Return the T1 Set High alarm to its previous setting.

6A.7.2.6 Remove the temperature simulator cable from the monitor and patient simulator. Close the Temp notebook.

6A.8 Cardiac output tests:

6A.8.1 Connect the cardiac output (CO) cable adapter (P/N 4117118) and injectate switch supplied with simulator to the C.O./Temp connector of the simulator, and the other end of the cable to the CO connector on the monitor.

(✔) 6A.8.2 Verify the monitor displays a BT reading between 36.0 and 38.0.

6A.8.3 Touch the CO window to open the CO notebook. Touch the Alarms tab.

6A.8.4 Toggle the Alarm Control key to ON. Note the original Blood Temp limits.

(✔) 6A.8.5 Select Set Lo. Raise the Blood Temp Limit Set Lo alarm above the actual value. The Caution message T BLOOD LO shall appear on the central alarm display and an intermittent audible alarm shall sound. Readjust the alarm below the actual value. The alarm shall cease. Return the Blood Temp Lo limit to its previous setting.

(✔) 6A.8.6 Touch the Blood Temp Limit Set Hi key. Decrease the Set Hi alarm below the actual value. The Caution message T BLOOD HI shall appear on the central alarm display and an intermittent audible alarm shall sound. Readjust the alarm above the actual value. The alarm shall cease. Return the Blood Temp Hi alarm to its previous setting.

6A.8.7 Touch the CO Setup tab.

(✔) 6A.8.8 Toggle the CO simulator injectate temperature (IT) switch to 0.0°C. Wait for the INJECT WHEN READY message to appear on the bottom of the Setup notebook. Enter Code “92” on the simulator. After computing is complete, verify the values are within an acceptable range. Toggle IT switch to 24.0°C. Wait for the INJECT WHEN READY message to appear on the bottom of the screen. Enter Code “95” on the simulator. After computing is complete, verify the values are within an acceptable range.

Simulator IT Setting	Monitor IT Reading Range
0.0°C	-0.3 - +0.3
24.0°C	22.8 - 25.2

6A.8.9 Disconnect the CO cable adaptor from the C.O./TEMP connector of the monitor. Close the CO notebook.

6A.9 SPO2 / PULSE

Touch Setup Enable SpO2 tone.

6A.9.1 If necessary, connect the SpO2 adapter cable (P/N 4117123) to the marquette pulse oximetry simulator (P/N 4117116).

6A.9.2 Connect the SpO2 adapter to the Integrated Patient Monitoring Module interface.

6A.9.3 Toggle the OHMEDA/NELLCOR selector switch to NELLCOR, and turn on the simulator.

(✔) 6A.9.4 Adjust the simulator pulse rate knob to 160 B/M. Using the white scale, adjust the simulator SpO2 to 99%. The monitor shall display a value between 96 and 100 for oxygen saturation, and a value between 155 and 165 for a pulse rate.

(✔) 6A.9.5 Adjust the simulator pulse rate knob to 70 B/M. Adjust the simulator SpO2 knob to 68.4%. The monitor shall display a value between 66 and 71 for oxygen saturation, and a value between 68 and 72 for a pulse rate.

(✔) 6A.9.6 Adjust the simulator pulse knob to 100 B/M. Adjust the simulator SpO2 knob to 80.3%. The monitor shall display a value between 77 and 83 for oxygen saturation, and a value between 97 and 103 for a pulse rate.

6A.9.7 Touch on the SpO2 window background to open the SpO2 notebook. Touch the Setup tab and toggle NIBP interlock and SpO2 Tone to ON. Touch the Volume tab and verify the slider bar is adjustable, then return it to the mid range position. Verify that an audible SpO2 tone sounds with each pulse.

6A.9.8 Select Alarms tab. Touch the Alarm Control toggle to ON, select Pulse channel. Note the pulse high and low alarm limit settings.

(✔) 6A.9.9 Select Set LO, raise the pulse low alarm limit above the actual pulse rate. The Warning message “OXI PULSE LOW” shall appear on the central alarm display and a continuous audible alarm shall sound. Readjust the alarm below the actual value. The alarm shall cease. Return the pulse low alarm limit to its previous setting.

(✔) 6A.9.10 Decrease the pulse high alarm limit below the actual pulse rate. The Caution message “OXI PULSE HIGH” shall appear on the central alarm display and an intermittent audible alarm shall sound. Readjust the alarm above the actual value. The alarm shall cease. Return the pulse high alarm limit to its previous setting.

6A.9.11 Select SpO2 channel. Note the SpO2 high and low alarm settings.

(✔) 6A.9.12 Select Set LO, raise the SpO2 low alarm limit above the actual SpO2 value. The Warning message “SPO2 LO” shall appear on the central alarm display and a continuous audible alarm shall sound. Decrease the SpO2 alarm limit below the actual SpO2 value. The alarm shall cease. Return the SpO2 low alarm limit to its previous setting.

(✔) 6A.9.13 Decrease the SpO2 high alarm limit below the actual SpO2 value. The Caution message “SPO2 HI” shall appear on the central alarm display and an intermittent audible alarm shall sound. Raise the SpO2 Hi alarm limit above the actual SpO2 value. The alarm shall cease. Return the SpO2 high alarm limit to its previous setting.

6A.9.14 Disconnect the pulse oximetry simulator from the Integrated Patient Monitoring Module interface. Turn the simulator power switch to the OFF position.

6A.9.15 Connect the SpO2 interface cable (P/N 4113453) to the Integrated Patient Monitoring Module interface. Connect a finger probe (P/N 4113823) to the interface cable.

6A.9.16 Attach the sensor to the operator’s finger and obtain a pulse and oxygen saturation.

6A.9.17 If either pulse or SpO2 alarm appear, readjust the alarm limits accordingly.

6A.9.18 Disconnect the sensor from the finger.

(✔) 6A.9.19 Within ten seconds, the Warning message NO OXI PULSE shall appear on the central alarm display and a continuous audible alarm shall sound.

6A.9.20 Touch the SpO2/Pulse bell to disable the alarm.

6A.10 NIBP

(✔) 6A.10.1 NIBP Calibration

6A.10.1.1 Access Service mode, select Service Monitors notebook, select CVP tab.

6A.10.1.2 Remove the NIBP cable from the Integrated Patient Monitoring Module interface panel.

6A.10.1.3 Press the NIBP ZERO CALIBRATE key. NIBP Zero Cal in Progress will be displayed at the bottom of the notebook page. Wait until calibration is complete.

6A.10.1.4 Connect NIBP test cable (P/N 4113454) to the Integrated Patient Monitoring Module interface panel. Insert the NIBP test adapter (P/N 4116111) in line between either of the adult cuff (P/N 4113395-001) tubes and the corresponding interface tube. Connect a calibrated PDM to the NIBP test adapter. Wrap the adult cuff around an appropriately sized solid cylindrical object.

6A.10.1.5 Press the NIBP GAIN CALIBRATE key. This button label will change to SET CAL PRESSURE TO XXX. When the pressure stabilizes, use the arrow keys to adjust this value 1 mmHg below current manometer reading.

6A.10.1.6 When pressure reaches the selected value, press the SET CAL PRESSURE XXX key.

6A.10.1.7 Press the NIBP CHECK CALIBRATE key.

6A.10.1.8 Observe NIBP pressure value displayed at the lower right corner of the screen. Press the NIBP STOP CALIBRATE key when pressure values on the monitor equal the value on the meter ±1 mm Hg for one minute.

6A.10.1.9 Remove the test equipment; re-configure the cuff onto the interface hose, and exit the Service Menu.

6A.10.2 NIBP Verification

6A.10.2.1 Install the BP cuff on your arm.

6A.10.2.2 Touch the NIBP window to open the NIBP notebook.

6A.10.2.3 Select the Set Up tab.

6A.10.2.4 Adjust the Auto Interval slider bar to 5 min., set Patient Age to Adult.

6A.10.2.5 Touch the START key on the NIBP window. When the BP measurement cycle is complete, touch the Alarms tab, and note all NIBP parameters. Toggle the alarm control to ON, toggle the Alarm Limits PRESSURE key to Select Sys.

(✔) 6A.10.2.6 Raise the Sys Set Lo alarm above the actual value. Verify that NIBP SYS LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original setting.

(✔) 6A.10.2.7 Lower the Sys Set Hi alarm below the actual value. Verify that NIBP SYS HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original setting.

6A.10.2.8 Touch the PRESSURE key and toggle to Dias.

(✔) 6A.10.2.9 Raise the Dias Set Lo alarm above the actual value. Verify that NIBP DIAS LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original setting.

(✔) 6A.10.2.10 Lower the Dias Set Hi alarm below the actual value. Verify that NIBP DIAS HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original setting.

6A.10.2.11 Touch the PRESSURE key and toggle to Mean.

(✔) 6A.10.2.12 Raise the Mean Set Lo alarm above the actual value. Verify that NIBP MEAN LO appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to below the actual value. The alarm shall cease. Return the alarm to its original setting.

(✔) 6A.10.2.13 Lower the Mean Set Hi alarm below the actual value. Verify that NIBP MEAN HI appears as a Caution and an intermittent audible alarm shall sound. Readjust the alarm to above the actual value. The alarm shall cease. Return the alarm to its original setting.

(✔) 6A.10.2.14 Touch the STAT key on the NIBP window. The cuff should inflate and cycle repetitively. The time between deflation and the next inflation shall be less then three seconds. Press STOP.

(✔) 6A.10.2.15 Connect a SpO2 finger probe to a finger on the same arm as the BP cuff. After SpO2 and pulse values are displayed, enable the SpO2 alarms. Press START on the NIBP window. Verify that SpO2 alarms are disabled until the NIBP measure is completed. Disable the SpO2 alarm. Set the NIBP function to Stop.

(✔) 6A.11 Strip Chart Recorder Assembly

6A.11.1 Touch the Print Key icon or the To Primary Keys icon. Then touch the Print icon to open the Printer notebook.

6A.11.2 Touch the Select Wave tab. Touch the SELECT WAVEFORM 1 key. Select any item found in the drop down list that has available data. Repeat this step for Waveform 2.

6A.11.3 Touch the Options tab. Open the printer door and remove the paper roll. Verify that the Door Open message is displayed in the Print Options notebook.

6A.11.4 Close the printer door. Touch Quick Waveform Print (30 sec). Verify that Paper Out message is displayed in the Alarms window and the Print Options notebook.

6A.11.5 Open the printer door and insert paper (use test paper P/N 4110335 if needed) into the printer. (Note that loose end should be at the bottom of roll.) Close the printer door.

6A.11.6 Touch the Quick Waveform Print key, then press the Stop Print key. Verify that each data waveform is recorded on the printout.

6A.11.7 Touch the Print Vital Signs key. Verify that all available data is recorded on the print out.

6A.11.8 Touch the Print Data Log key, then press the Stop Print key. Touch the Data Log key and verify that the information in the data log agrees with the print out. Touch the Data Log key to close the data log.

6A.11.9 Touch the Start Continuous Waveform Print key. Verify that it is functional, then touch the Stop Print key.

(✔) 6A.12 Final IPMM and Strip Chart Recorder Checks

6A.12.1 Remove all test equipment; return all cables, hoses and accessories to their original configuration. Turn the MARQ-11 simulator to the OFF position.

6A.12.2 Touch the Set Up key and select the Traces tab. Return the number of screen traces to the original configuration.

7.0 SYSTEM UPDATES

7.1 Exclusion System Update

This procedure applies only to machines within the serial number range of 10000 thru 10187. For machines with serial numbers 10188 and later, refer to the Right Vaporizer Vertical Adjustment procedure given in Section 5.

This procedure outlines the steps needed to ensure correct exclusion system operation in cases where there is difficulty in engaging the right (viewed from the front) vaporizer.

7.1.1 Remove the vaporizer from the right exclusion mount.

7.1.2 Remove the bottom cover from the cockpit area. See Figure 7-1 on the following page.

7.1.3 Remove the adhesive backing from a thin (0.030 in.) shim (eng. P/N REB002).

7.1.4 Hold the shim as shown in Figure 7-1 on the following page. Slide it up into the left side of the cockpit area, then toward the center until it slides between the chassis bracket and the front panel. Verify that the shim is centered over the backet and pull down on the shim to set it in place.

NOTE: It may also be necessary to pull out on the button mounted mounted on the front panel to allow the shim to slide between the panel and the chassis bracket.

7.1.5 Reinstall the vaporizer and verify the proper operation of the exclusion system. If the exclusion bar still does not properly slide into the vaporizer cap because of excessive sagging, install the larger thickness (0.060 in.) shim. If the exclusion bar still does not properly slide into the vaporizer cap because of excessive sagging, use both shims. If problems still exist, contact DrägerService.

7.1.6 If any other vaporizers are secured to the NM6000, temporarily install each one in the right exclusion mount and repeat Step 7.15.

7.1.7 Secure the lower portion of the shim to the copper tube at the main switch using an 8 in. tie strap.

7.1.8 Reinstall the bottom cover on the cockpit area.

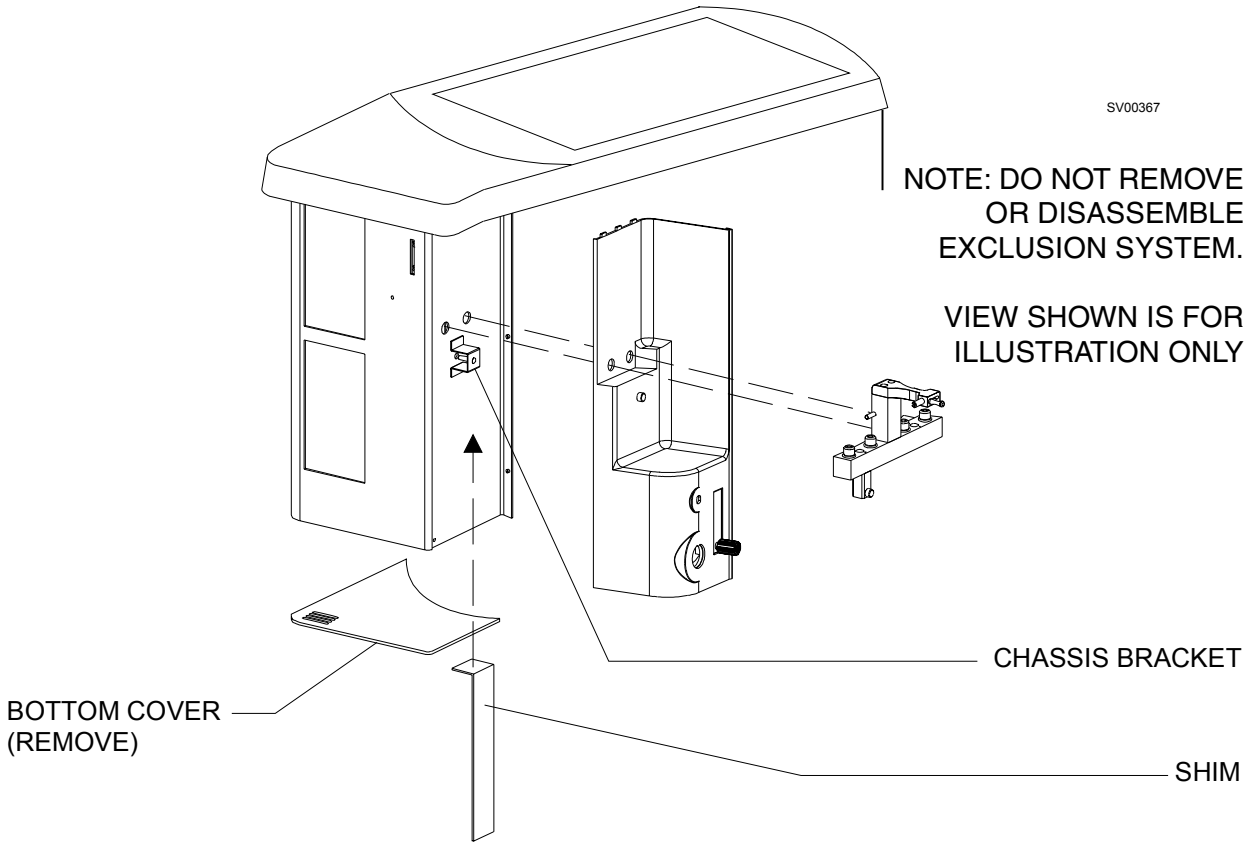


Figure 7-1. Shim Installation for Exclusion System Update

7.1.9 Perform the following NM6000 PMS Procedures:

Fresh gas leak test (6.14)

Verify that the vaporizer concentrations are within the tolerances listed in the analyzer accuracy test. (6.21.3)

Vapor exclusion system (6.25)

Auxiliary oxygen flowmeter (6.10.4)

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Figure 7-2. deleted

7.3 Deleted

Figure 7-3. Deleted

Figure 7-4. Deleted

7.4 Deleted

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Figure 7-5. Deleted

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Figure 7-6. Deleted

7.7 Installation of Flow Sensor Anti-rotation Bracket

7.7.1 Remove the flow sensor mount from the breathing system.

7.7.2 Assemble the anti-rotation bracket on the flow sensor mount - with the bracket spacers oriented as shown in Figure 7-7.

7.7.3 Reinstall the flow sensor mount on the breathing system.

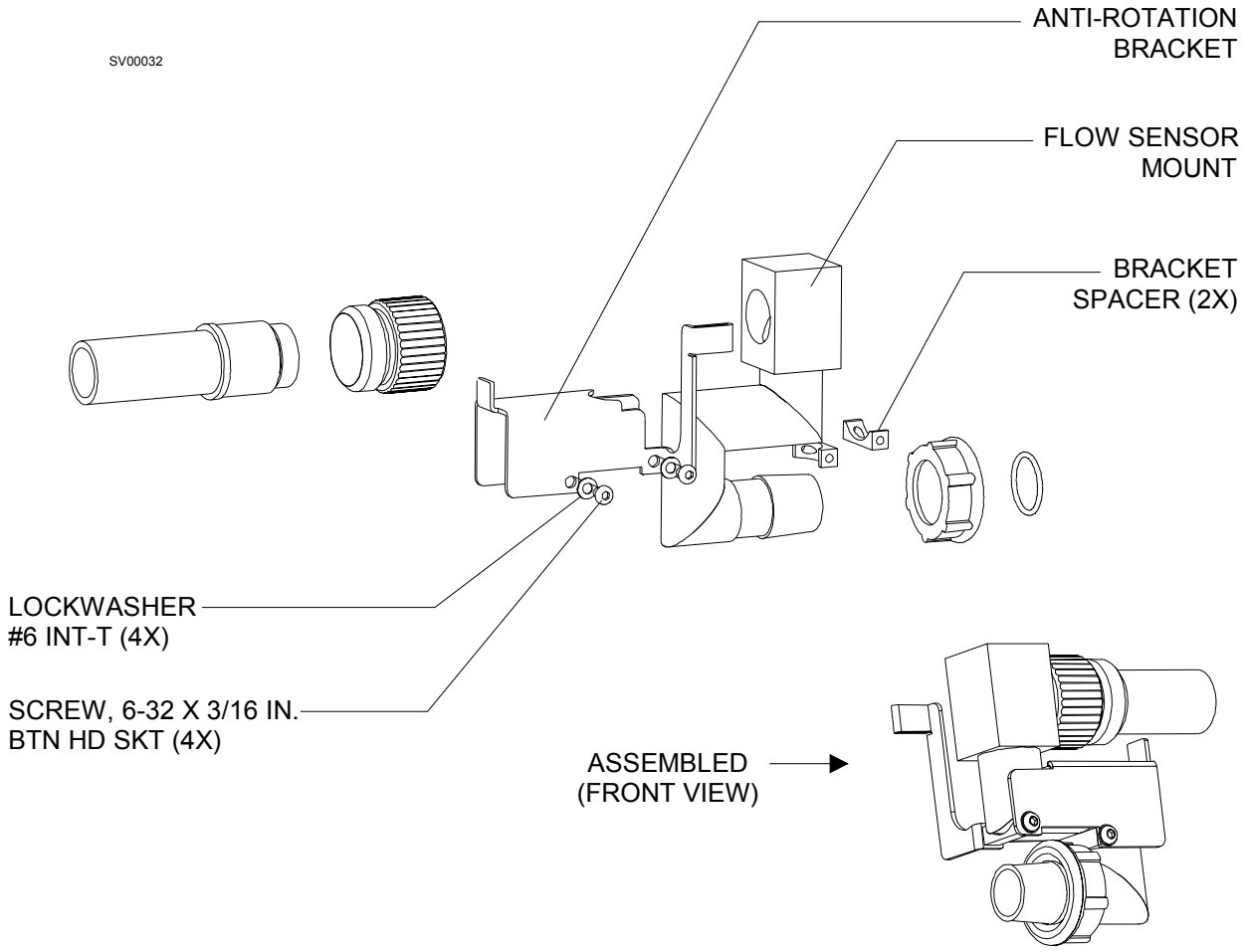

Figure 7-7. Anti-rotation Bracket Assembly

7.8 Installation of Bag Arm O-ring, Locking Knob, and Friction Screw Adjustment

O-ring Installation:

7.8.1 Un-screw the knurled collar on the bag arm, and lift off the bag arm.

7.8.2 Install the O-ring on the stem of the bag arm. Ensure that the O-ring is seated against the retaining ring. See Figure 7-8.

7.8.3 Reinstall the bag arm on the pole, and ensure that the knurled collar is tight.

Bag Arm Locking Knob Installation:

7.8.4 Remove the existing screw and install the bag arm locking knob in the threaded hole in the side of the bumper, as shown in the illustration. Ensure that there is no existing screw in this hole.

7.8.5 Adjust the friction screw as follows: Using a flat blade screwdriver, turn the screw in (clockwise) until it bottoms, then back it out ⅛ of a turn.

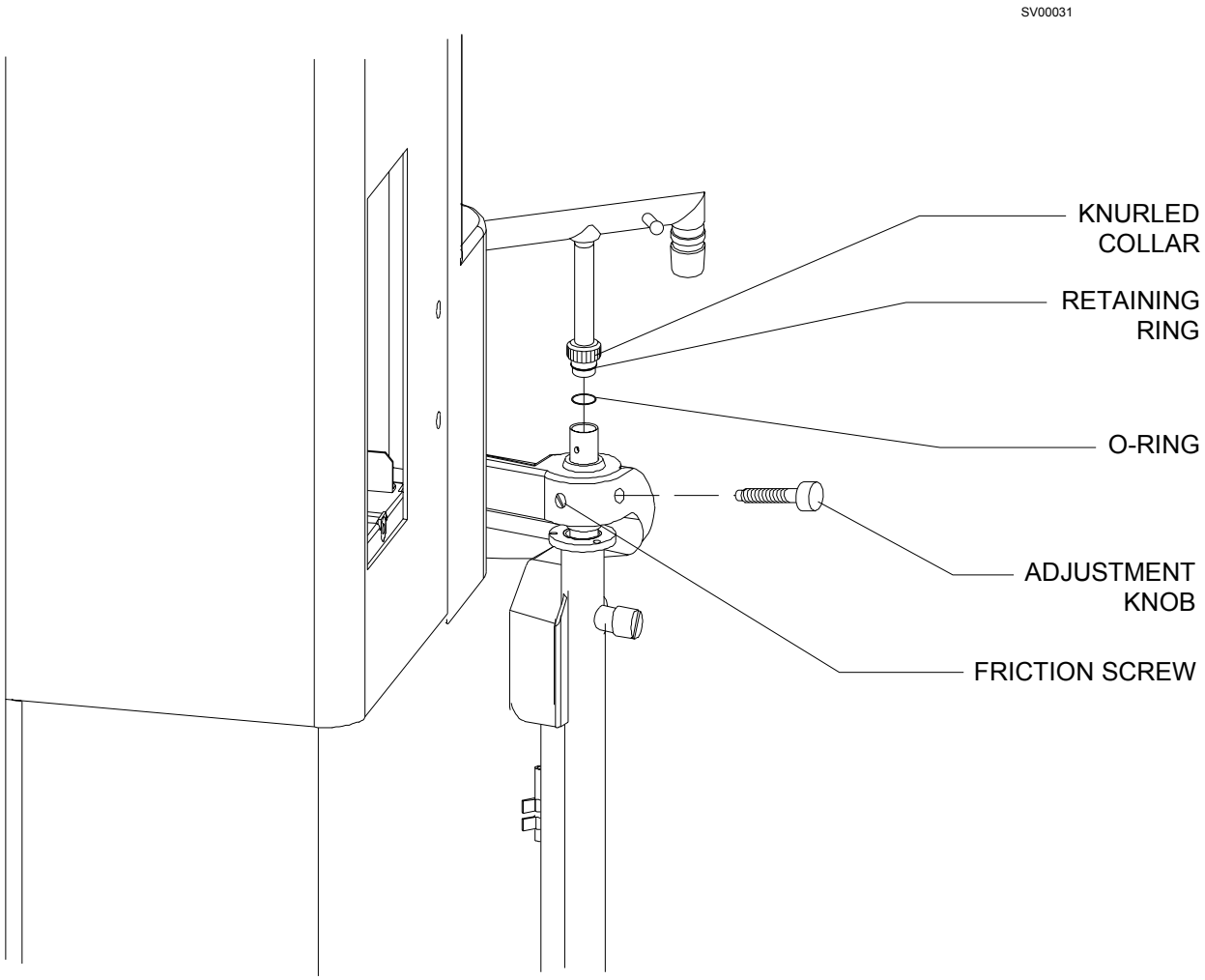

Figure 7-8. Bag Arm O-ring, Adjustment Knob and Friction Screw

7.9 Lubrication of Ventilator Piston Rod

7.9.1 Turn the System Power switch to STANDBY.

7.9.2 Open the hinged top of the ventilator.

7.9.3 Turn the breathing system locking bar ¼ turn CCW, then pull the release lever on the piston cylinder unit up, and remove the piston cylinder unit from the ventilator.

7.9.4 Partially press the piston rod release screw, and pull the piston rod out. See Figure 7-9.

7.9.5 If the rod shows signs of excessive wear, replace the entire piston cylinder unit.

7.9.6 Wipe off any old lubricant and wear debris.

7.9.7 Apply a thin film of Molykote 55 lubricant (P/N 4115127) to the rod, then return the piston rod to its previous position.

7.9.8 Reinstall the piston cylinder unit in the ventilator and lock the breathing system in place.

7.9.9 Turn the System Power switch to ON and allow the NM6000 to complete its power-up sequence. Do not bypass the Divan Self Test.

7.9.10 Test the ventilator for proper mechanical operation and ensure that the piston operates quietly.

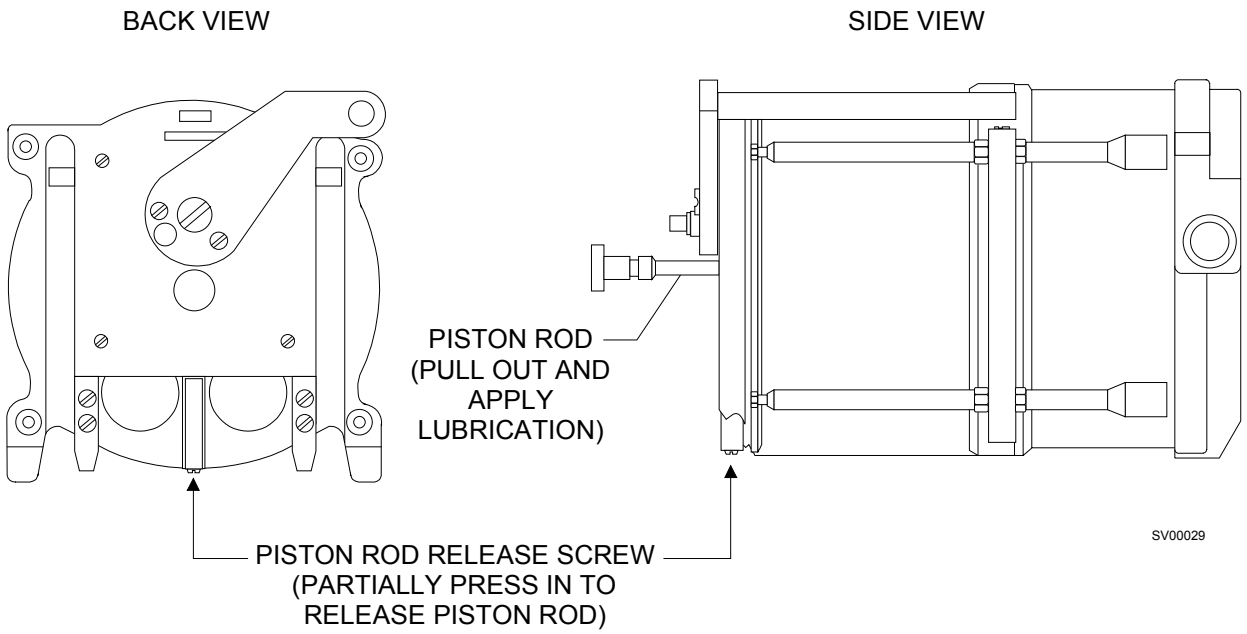

Figure 7-9. Piston Rod Lubrication

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7.11 Vitalbus Hub Conversion to Single Com Port Configuration

Vitalbus Hub conversion from a 4-port to a single port arrangement is needed when a P/N 4116918, (aka 4116725) or SE4116918 processor with one comunication port is installed in the NM6000.

Refer to Section 4.22 for information on the existing 4-port Vitalbus assembly.

7.11.1 Remove the four existing com port cable assemblies from the Vitalbus assembly door.

CAUTION:Use ESD protection when handling the PCB assembly. The PCB contains static sensitive devices.

7.11.2 Assemble the iso port PCB and its mounting bracket to the Vitalbus door as shown in Figure 7-10.

7.11.3 Connect the cables from the processor to the iso port PCB as shown in Figure 7-11.

NOTE: Ensure that the convenience outlet power cord is routed down along the side of the fan, and away from any electronic components on the PCB.

7.11.4 Close the Vitalbus assembly door and reconnect any cables that were previously.

7.11.5 Turn the system Power switch to ON and verify that the power-up self test is successfully completed.

7.11.6 Verify that any devices connected to the Vitalbus Hub are working properly.

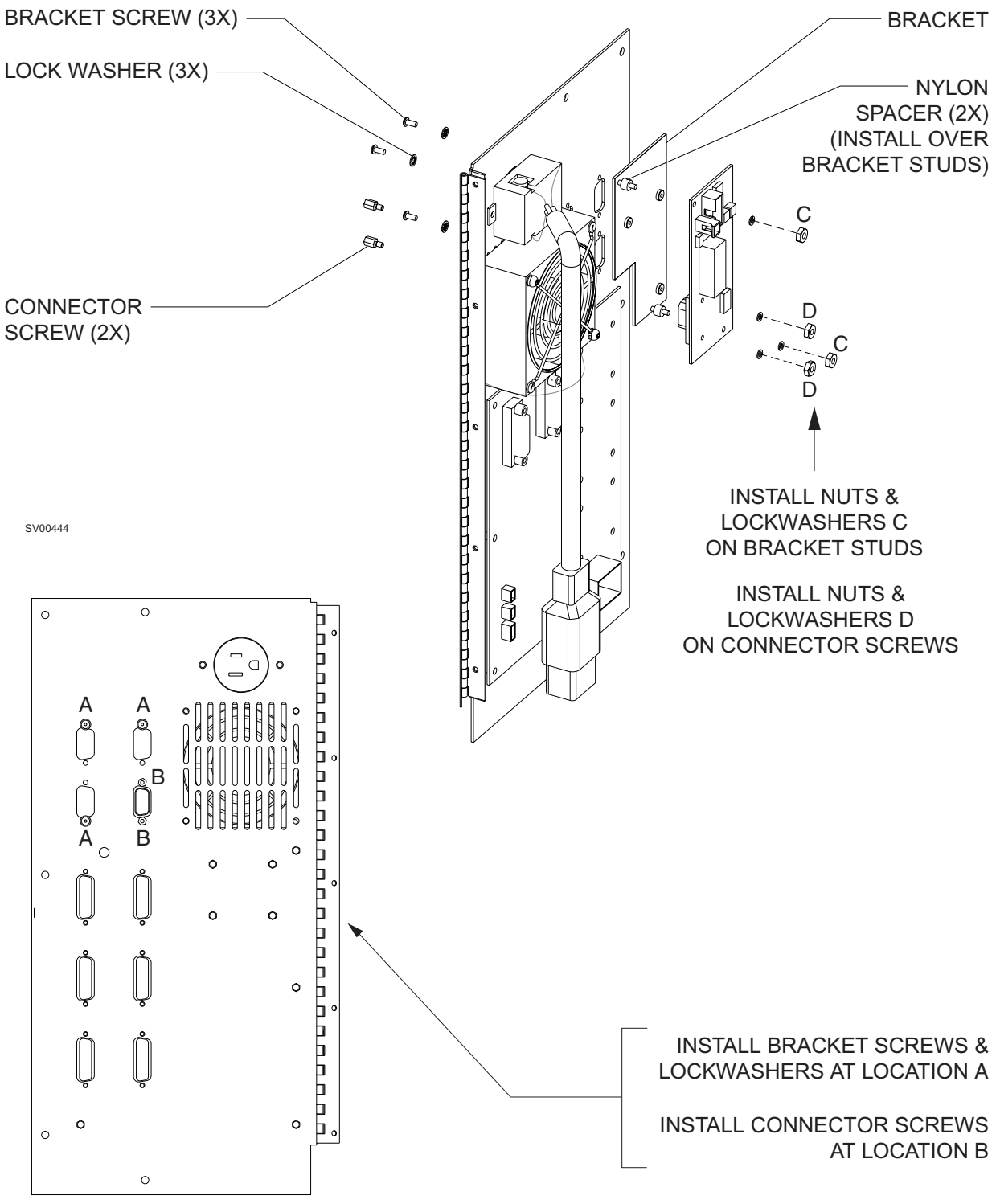


Figure 7-10. Iso Port PCB Installation

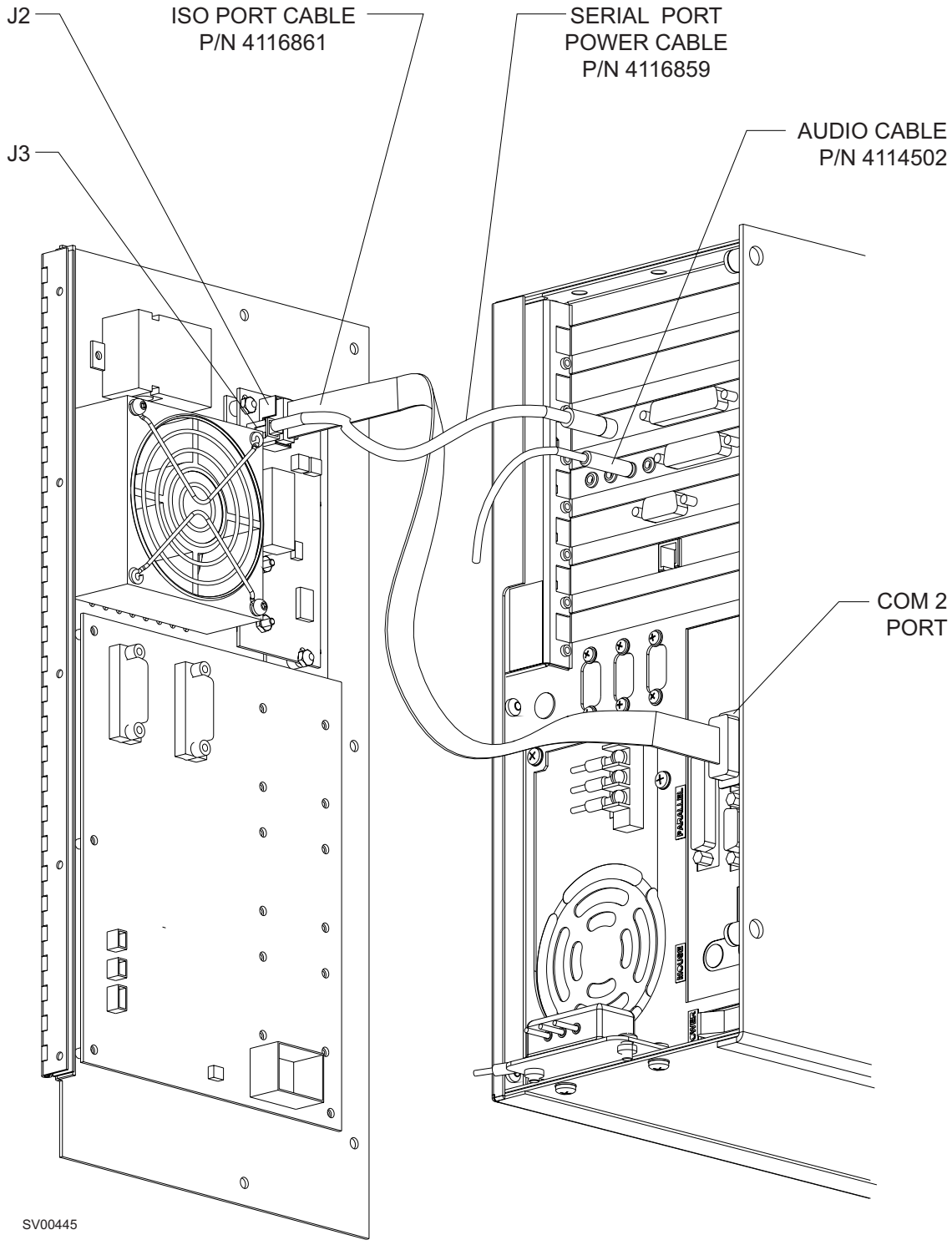


Figure 7-11. Iso Port Cable Connections

7.12 Divan Motor Drive Belt Lubrication

This lubrication procedure is intended to quiet audible 'creaking' of the Divan motor drive belt. Refer to Troubleshooting Guide 14 in Section 3 for information on all other audible noises.

7.12.1 Access to the Divan's motor drive belt requires removal of the complete Divan assembly from the Narkomed 6000. Refer to Ventilator Replacement: Complete Assembly in Section 4.

7.12.2 Remove the two screws from the top cover at the rear of the Divan assembly and remove it by sliding it back far enough to clear the retaining lip of the Divan housing.

7.12.3 Spray a small amount of 'Super Lube® Multi-Purpose Synthetic Lubricant' into a small container. Draw the lubricant from the container into a pipet (P/N 4115090).

7.12.4 Locate the motor drive belt assembly. See Figure 7-12.

7.12.5 Push the piston drive assembly all the way forward.

7.12.6 Using the pipet, apply a minimal amount of lubricant to the small drive sprocket.

CAUTION:Be careful not to drip lubricant onto the encoder assembly.

7.12.7 Pull the piston drive assembly back enough the rotate the small drive belt sprocket approximately one inch, and repeat the lubrication process until the piston drive assembly reaches its rear stop.

7.12.8 Move the piston drive assembly forward and back several times to spread out the lubricant over the drive belt. Repeat this motion and verify the drive assembly is quiet. If audible creaks are still heard, repeat the lubrication procedure but do not apply excessive amounts of lubricant.

7.12.9 Slide the front of the top cover under the lip of the Divan housing, then secure the hardware that was previously removed.

7.12.10Reinstall the Divan assembly on the Narkomed 6000. Refer to Ventilator Replacement: Complete Assembly in Section 4.

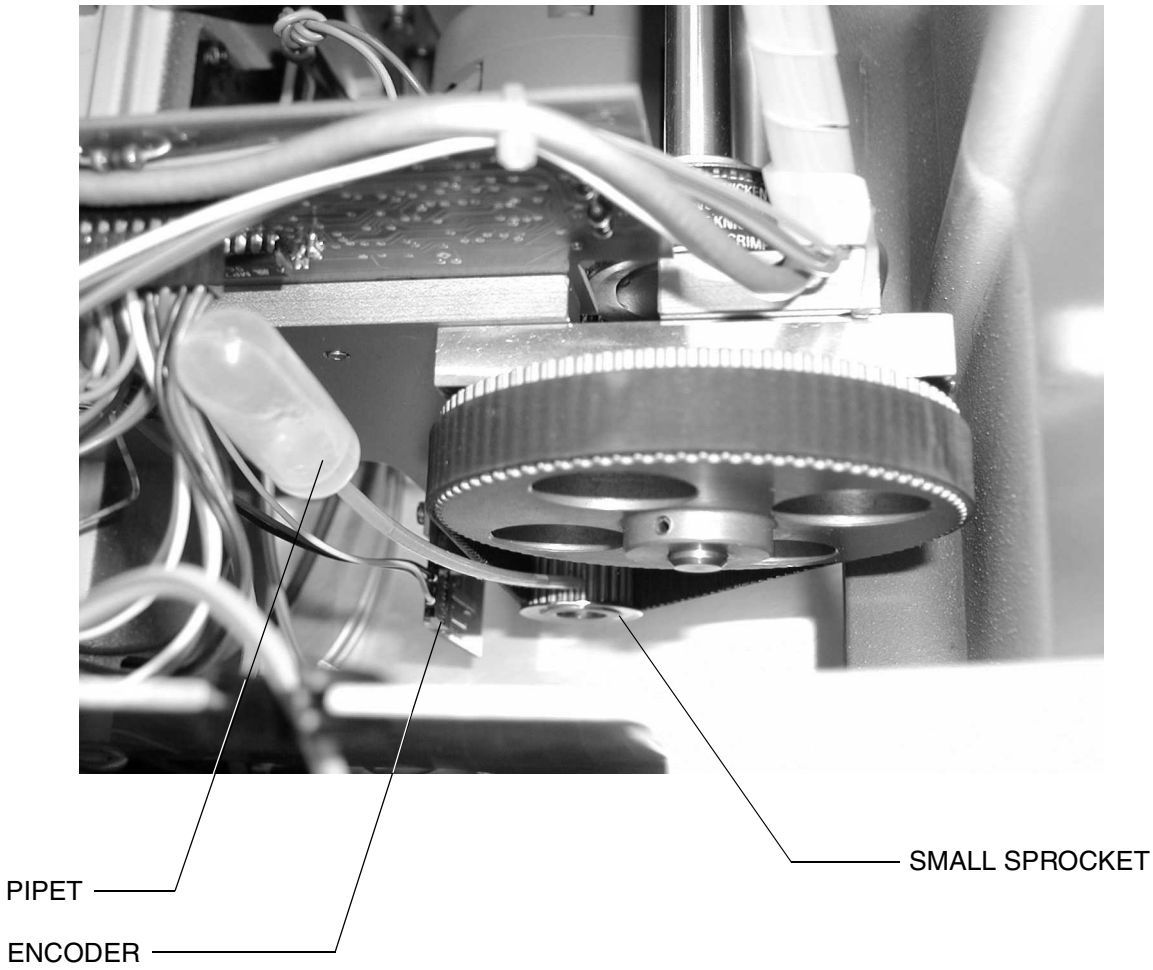


Figure 7-12. Motor Drive Belt Lubrication.

8.0 SPARE AND REPLACEMENT PARTS

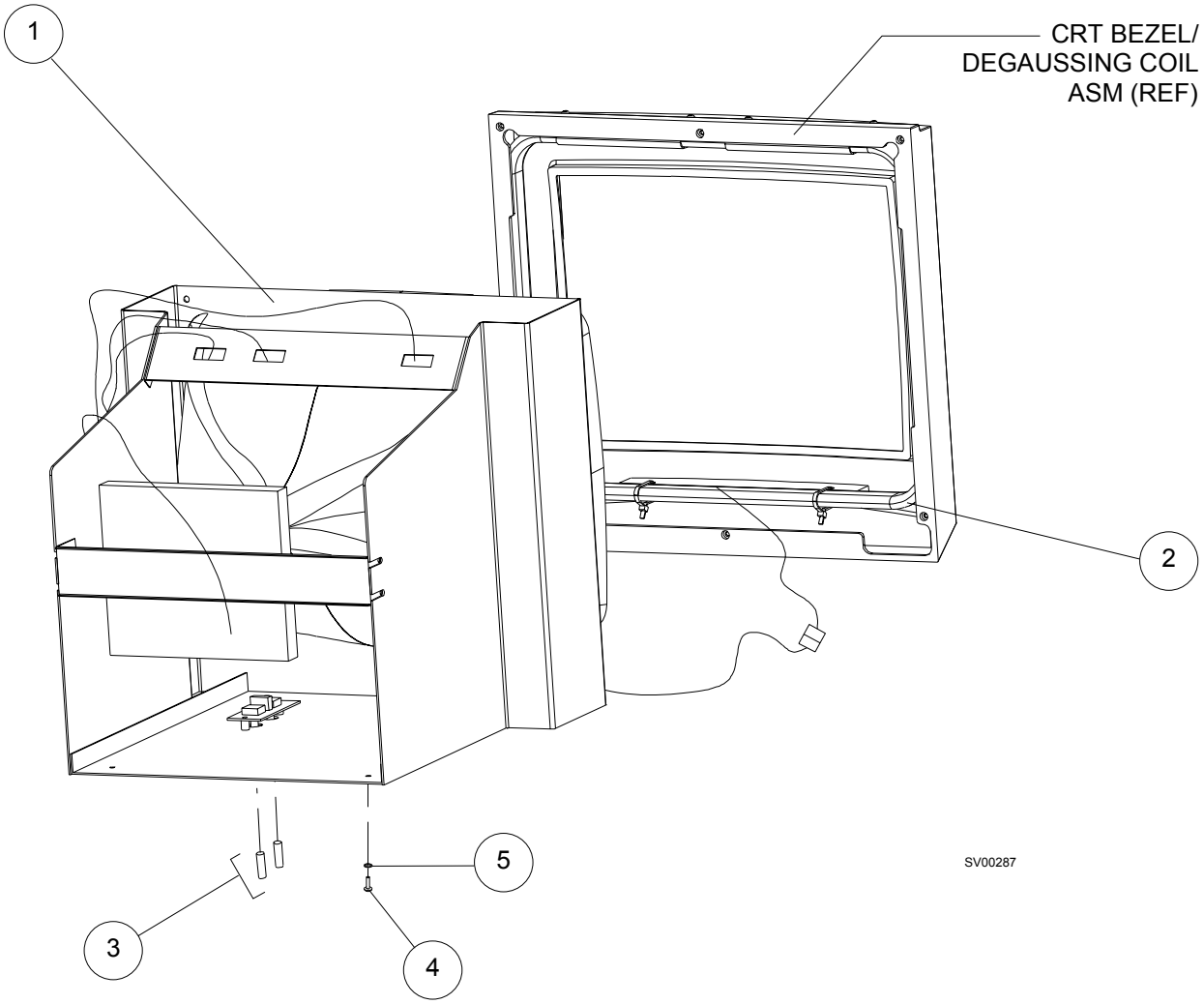
Part numbers for field-replaceable items on the Narkomed 6000 anesthesia system are listed on the following pages, along with part numbers for related hardware and cables.

The item numbers are keyed to the accompanying illustrations to aid in identifying the item and its location.

ASSEMBLY/PART PAGE

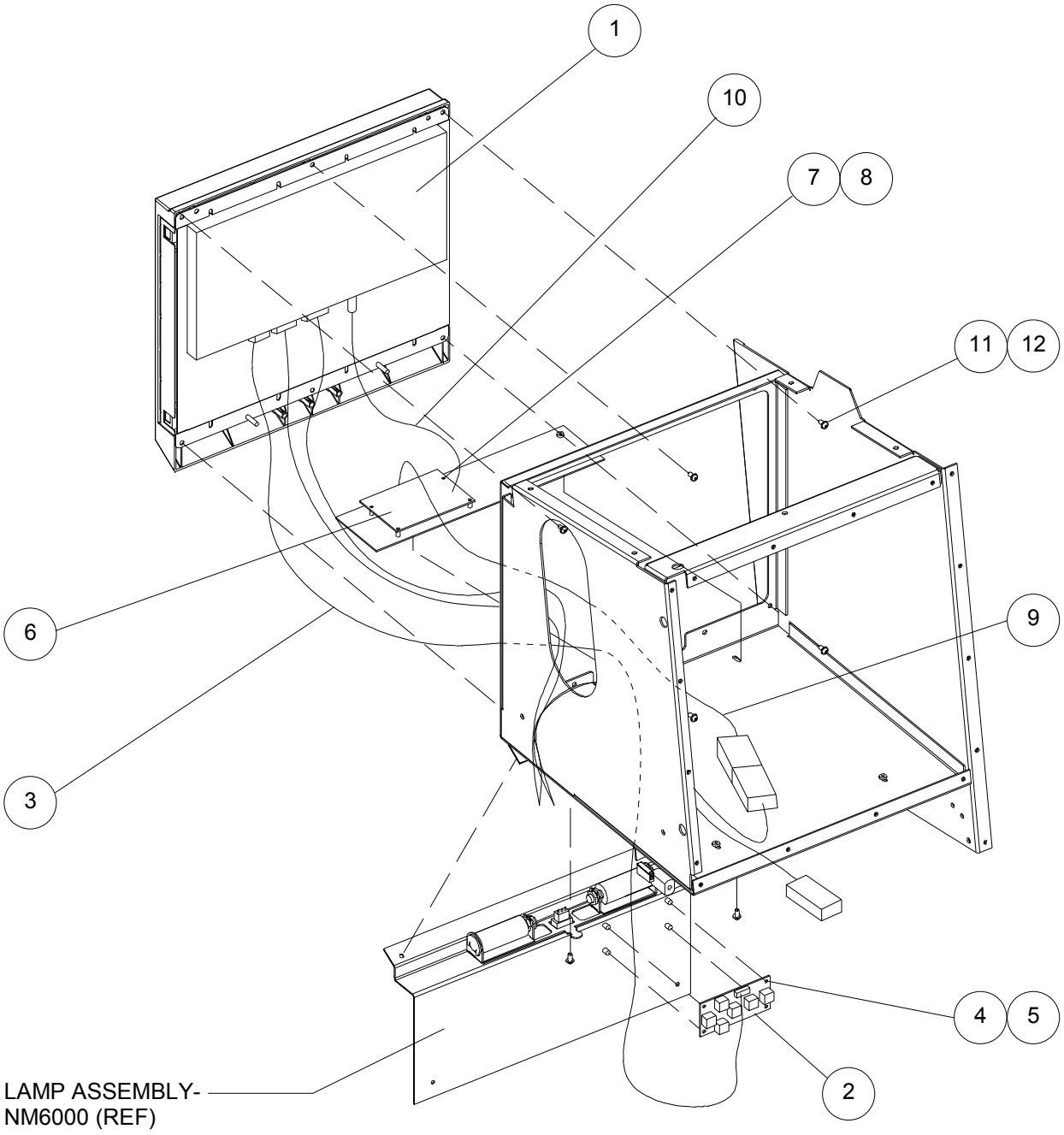
Monitor and touchscreen assembly, related parts 8-2, 8-3
Flat panel display and related parts 8-3A, 8-3B
Table lamp assembly 8-4, 8-5
Strip Chart Recorder Assembly 8-5A, 8-5B
Gas analyzer assembly and components 8-6, 8-7
Gas analyzer tubing and related items 8-7A, 8-7B
Integrated Patient Monitoring Module 8-7C, 8-7D
Divan piston-cylinder unit, lip seals 8-8, 8-9
Divan electronics assemblies, batteries 8-10, 8-11
Absorber canister and diffuser 8-11A, 8-11B
Divan motor drive assembly, pressure sensors, PEEP valve 8-11C, 8-11D
Divan breathing system 8-12, 8-13
Ultrasonic flow sensor, oxygen sensor, hose assemblies 8-14, 8-15
Pipeline inlets 8-16, 8-17
Failsafe assemblies, ORC, O_2 supply pressure switch, min. flow O_2 solenoid 8-18, 8-19
Flowmeter shield, knobs, gauges 8-20, 8-21
Auxiliary O_2 flowmeter 8-22, 8-23
Suction switch, vacuum valve asm, cockpit sub-asm, main switch 8-23A, 8-23B
Flow tubes, flow control valves 8-24, 8-25
Cylinder pressure regulators, O2 flush valve, Cyl cutoff valves (Canada) 8-26, 8-27
Bag arm assembly 8-27A, 8-27B
Cylinder yokes and related parts 8-28, 8-29
VPO assembly, interface assembly 8-30, 8-31
Vitalbus assembly 8-32, 8-33
Power supply, casters, processor and related items, cord retainer hardware 8-34, 8-35
Internal cables and wire harness assemblies 8-36, 8-37
Open Reservoir Scavenger 8-38, 8-39
Scavenger, A/C, Vent Grill Adapter 8-40, 8-41
Vapor mounting and exclusion system; paint, Loctite, Molykote, silicon adhesive . 8-42, 8-43
Boom Arm 8-44, 8-45

SPARE AND REPLACEMENT PARTS (continued) **NM6000**

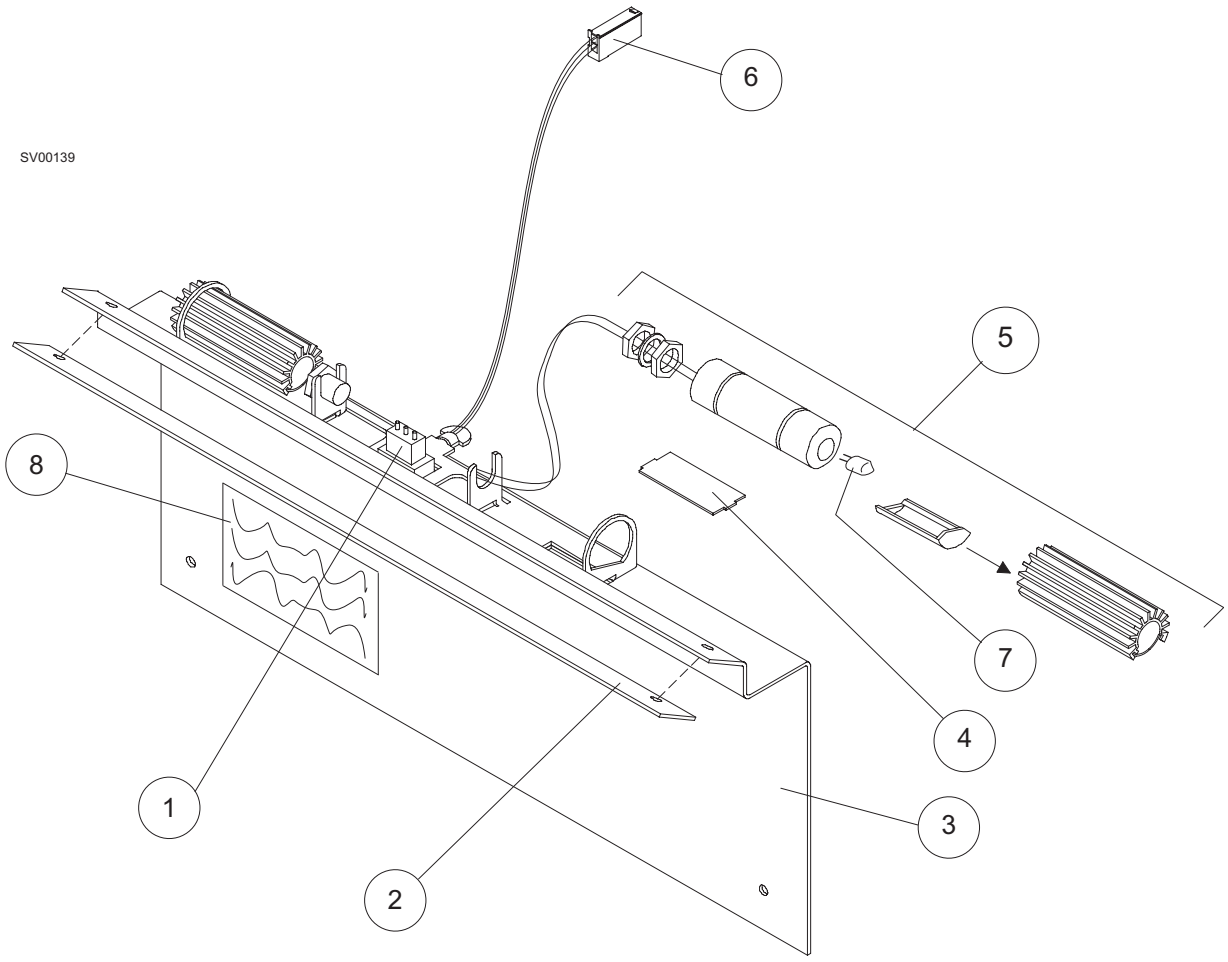


ITEM	DESCRIPTION	PART NUMBER
1	Monitor and touchscreen assembly (service exchange)	SE4114572
2	Degaussing coil	supplied with monitor
3	Brightness and contrast control shaft extensions	supplied with monitor
4	Screw, 8-32 x 5/16 in. btn hd skt (4x)	HW09081
5	Lock washer, #8 int-t (4x)	HW67000

SPARE AND REPLACEMENT PARTS (continued) **NM6000**



ITEM	DESCRIPTION	PART NUMBER
1	Flat Panel Display Assembly (service exchange)	SE4115060
	Flat Panel Display Assembly (new)	4115060
2	PCB Assembly	supplied with flat panel display
3	Ribbon cable, 9-cond.	supplied with flat panel display
4	Screw, 6-32 x ¼ in. btn hd (4x)	HW09076
5	Lock washer, #6 int-t (4x)	HW67007
6	Flat Panel Power PCB Assembly	4115135
7	Screw, 4-40 x 3/8 in. btn hd (4x)	HW09012
8	Lock washer, #4 int-t (4x)	HW67011
9	Cable Assembly, power wire harness to flat panel power PCB	4115178
10	Cable Assembly, flat panel power PCB to display	4115179
11	Screw, 8-32 x 5/16 in. btn hd skt (6x)	HW09081
12	Lock washer, #8 int-t (6x)	HW67000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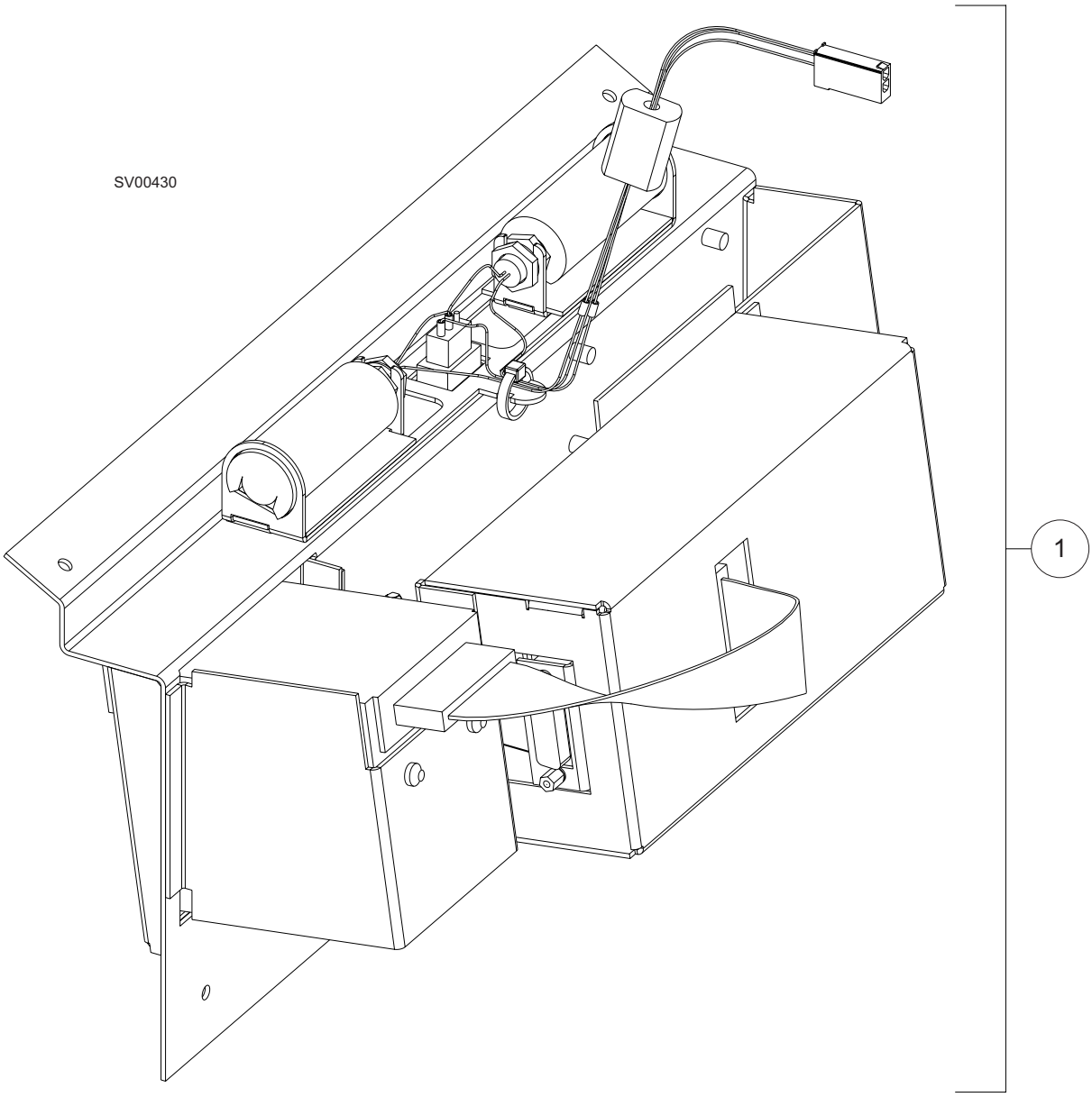
ITEM	DESCRIPTION	PART NUMBER
	Table Lamp Assembly	4114861
1	Switch	4113756
2	Trim Piece	4114903
3	Bracket	4114853
4	Lens (2x)	4114900
5	Lamp, 12 V (2x) incl. bulb, holder, leads & mtg. hardware	4113757
6	Connector, 2-ckt	4110502
	Terminal (2x)	4112610
7	Bulb, halogen 12 volt	4114114
8	Label, Suction Warning	4117092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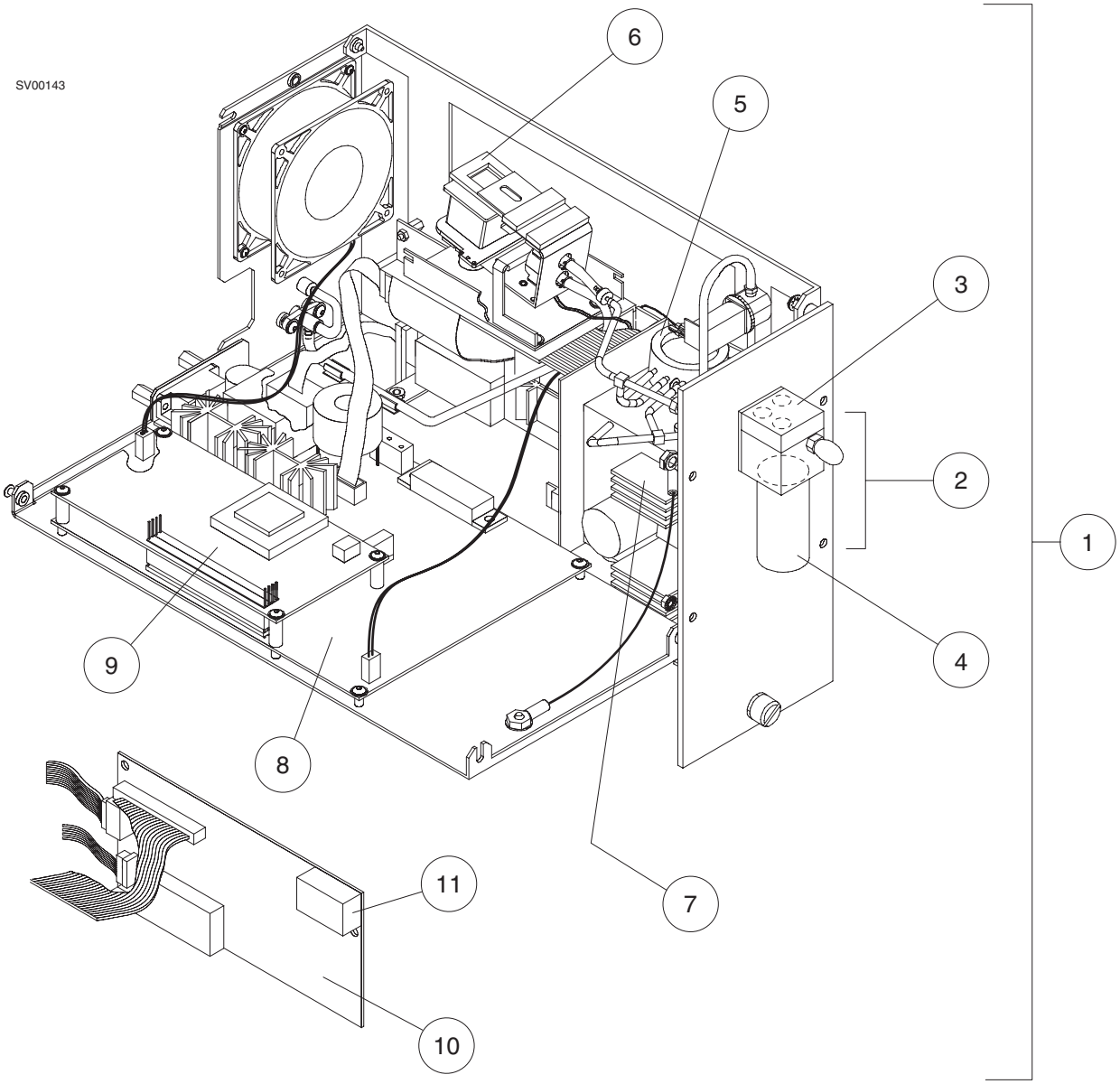
ITEM	DESCRIPTION	PART NUMBER
1	Strip Chart Recorder Assembly	4115050

The following items are listed for reference:

Paper roll	4110335
Vitalbus cable	4113065
Label, Suction Warning	4117092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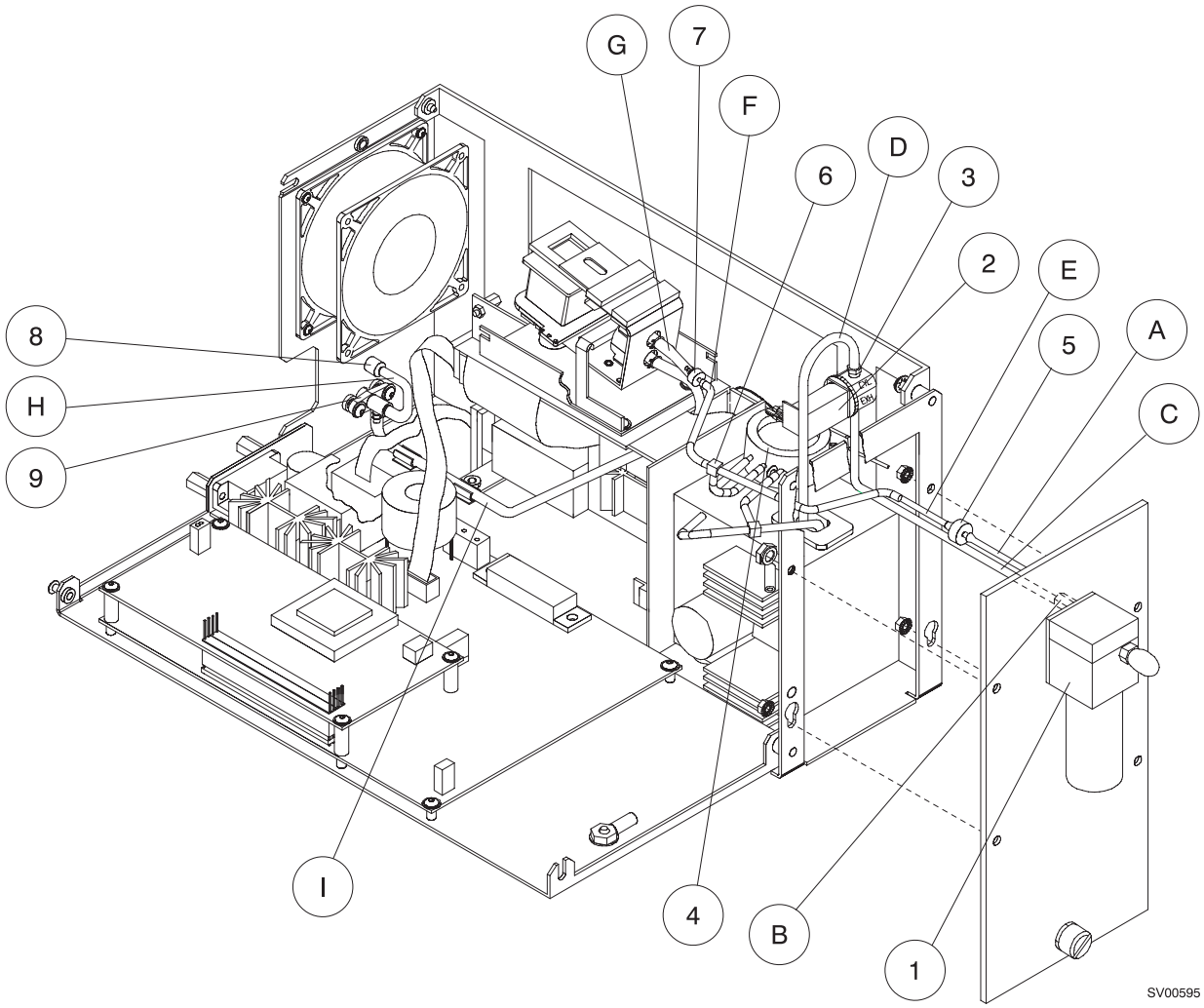
ITEM	DESCRIPTION	PART NUMBER
1	*GAP (Gas analyzer assembly) (service exchange)	SE4112970-007
	*GAP (Gas analyzer assembly) (new)	4112970-007
2	Water trap assembly	6870510
3	Filter (service replacement)	4114887
	Small O-rings (3X)	2312555
4	Container	8600227
	Large O-ring	2312556
5	Damper canister assembly, GAP	4117234
	Damper mounting screws (2x)	HW13004
6	Pump	4111764-001
7	IRIA (service exchange)	SE6870585
	IRIA (new)	4116630
8	GAP personality PCB	4113577-001
9	Common Processor PCB	4113595
10	IRIA controller PCB	6870464
11	Lithium Battery (TK RAM - IRIA)	1841688

Not shown:

PVC Sample line, 96 in.	4108103
Semi-permeable (Nafion) tube assembly (with label)	4115961
Firmware, v 1.03 (for NM6000 sw 2.06)	4114599-001

* Can only be used with NM6000 system software version ≥ 2.06.
If system is at earlier revision, kit 2.06 upgrade (P/N 4117240) is required.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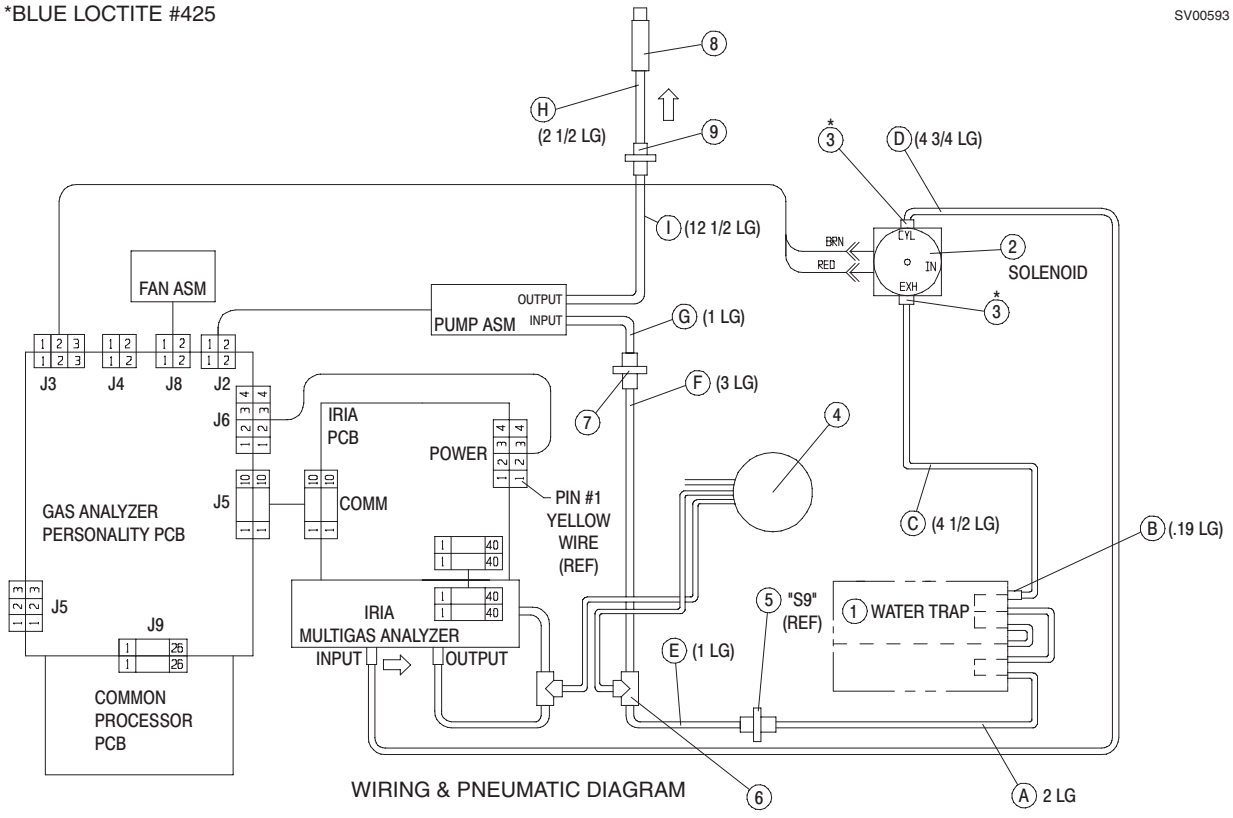
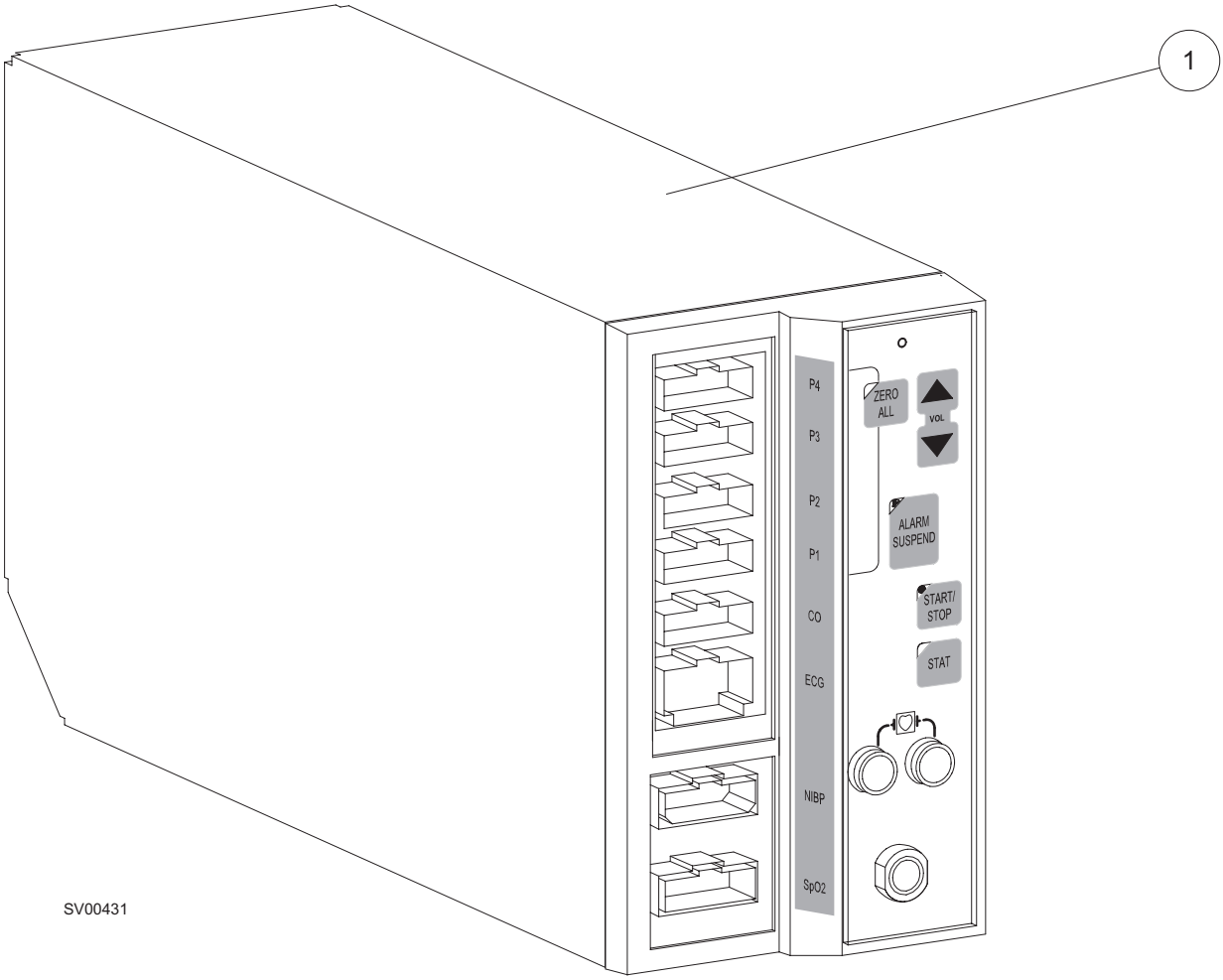
ITEM DESCRIPTION PART NUMBER

Item	Description	Qty	P/N	Item	Description	Qty	P/N
1	Water Trap	1	6870510	A	Hose, Natural 0.075ID x 0.03	2.0”	ML08003
2	Solenoid	1	4111377	B	Hose, Natural 0.075ID x 0.03	0.19”	ML08003
3	Ftg, Str 1/16 x 10-32 M	2	4114908	C	Hose, Clear 0.05ID x 0.020W	4.5”	ML08012
4	Damper Assembly	1	4117237	D	Hose, Clear 0.05ID x 0.020W	4.75”	ML08012
5	Restrictor, 80 mL/min.	1	4111758-006	E	Hose, Natural 0.075ID x 0.03	1.0”	ML08003
6	Ftg, T, 1/16 ID hose	1	4102337	F	Hose, Natural 0.075ID x 0.03	3.0”	ML08003
7	Reducer, 1/16 x 1/8 ID hose	1	4102164	G	Hose, Clear 0.130 x 0.06W	1”	ML08007
8	Feedthru, 5/16-24 x 3/16 ID	1	4112018	H	Hose, Clear 0.130 x 0.06W	2.5”	ML08007
9	Restrictor, variable 1/4 barb	1	4107995	I	Hose, Clear 0.130 x 0.06W	12.5”	ML08007

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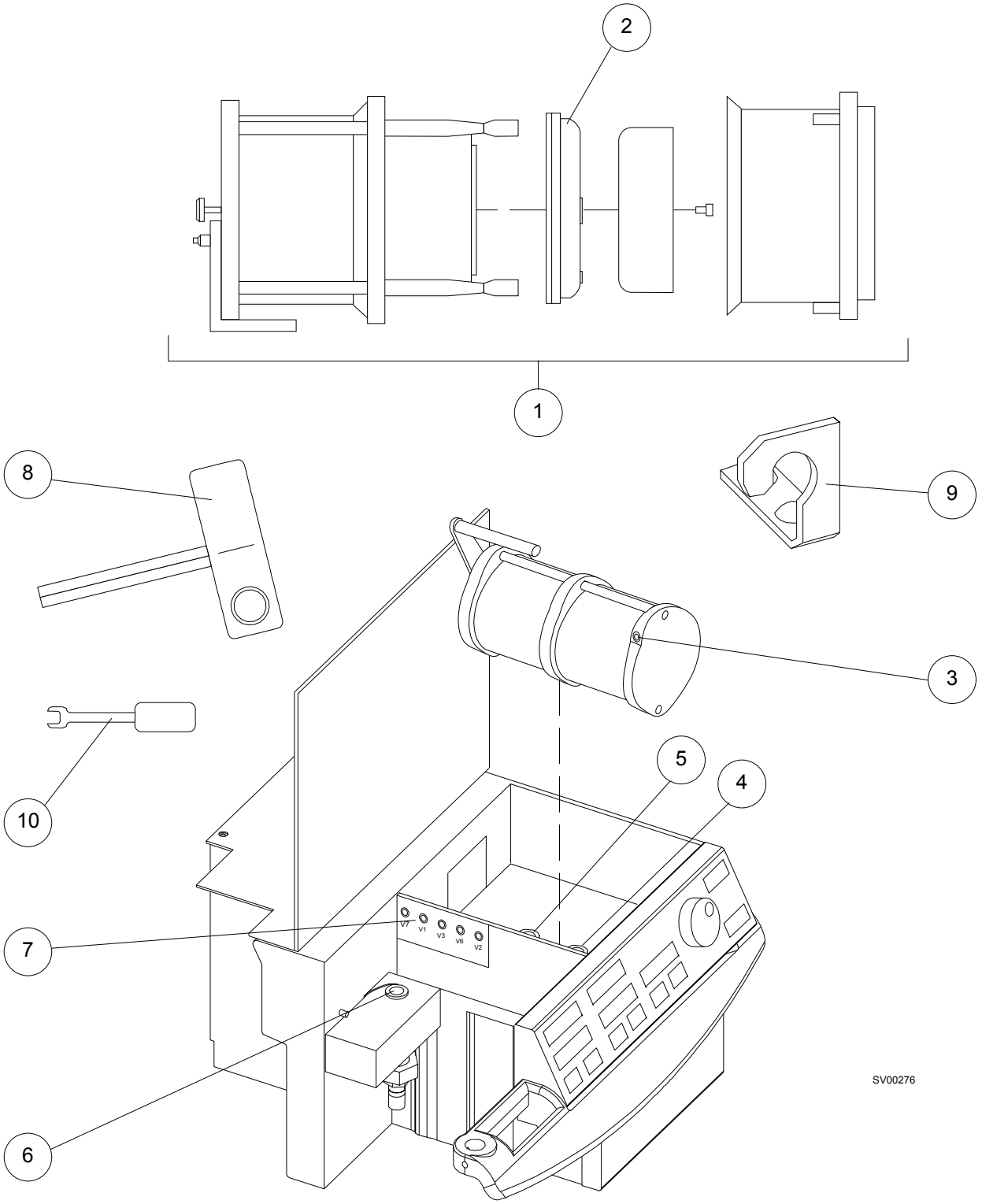
CO
ECG
NIBP
SpO2
ZERO ALL
VOL
ALARM SUSPEND
START/ STOP
STAT
SV00431

ITEM	DESCRIPTION	PART NUMBER
1	*Integrated Patient Monitoring Module (Service Exchange)	SE4113465-005
	*Integrated Patient Monitoring Module (new)	4113465-005
	Vitalbus Cable	4113065-001

Refer to the Integrated Patient Monitor Option Operator's Manual for a list of patient monitoring accessories.

* Can only be used with NM6000 system software version ≥ 2.06.
If system is at earlier revision, kit 2.06 upgrade (P/N 4117240) is required.
Refer to TSB 6007 for additional information.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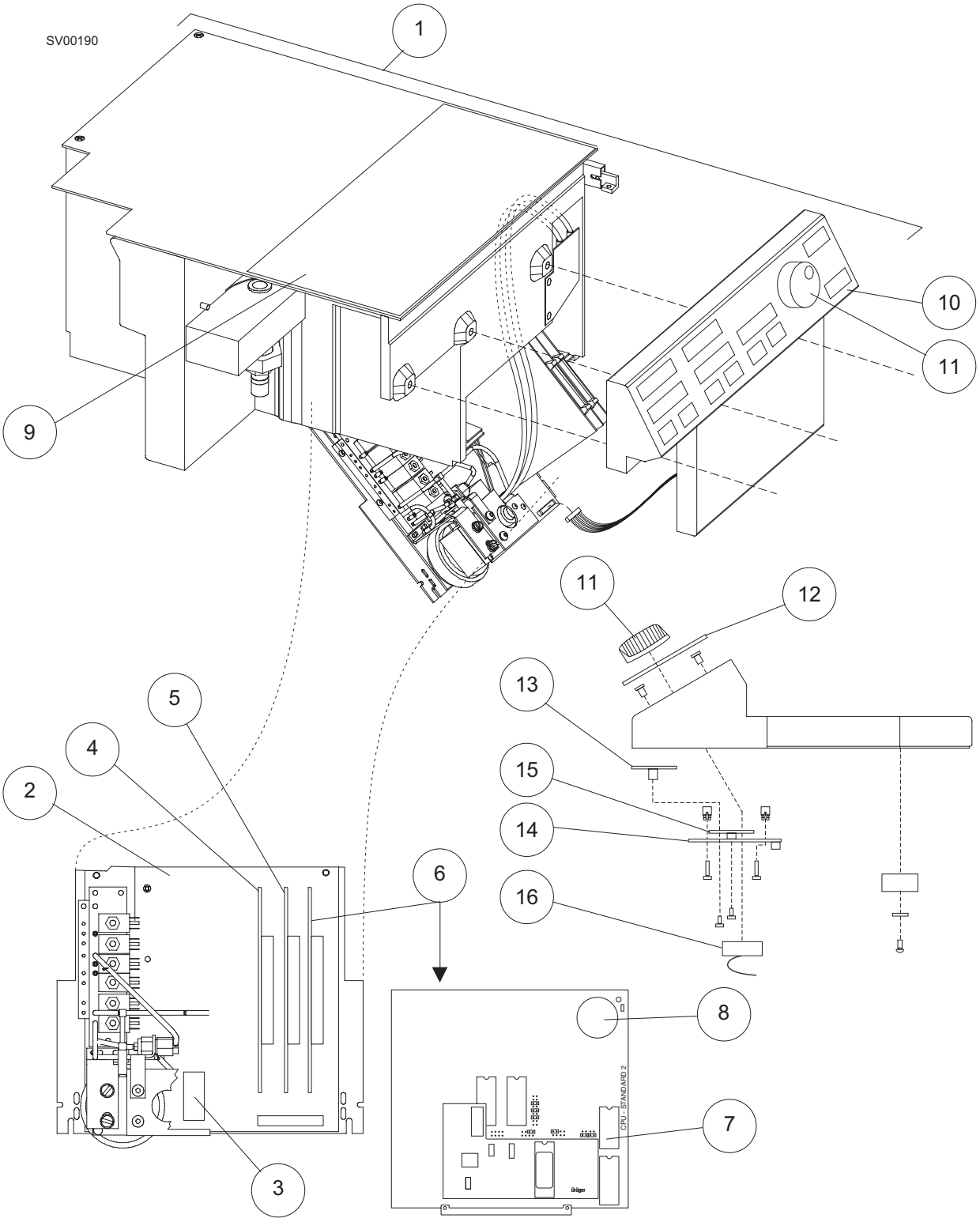
V7
V1
V3
V6
V2
SV00276

ITEM	DESCRIPTION	PART NUMBER
1	Piston-Cylinder Unit (service exchange)	SEM29575
	Piston-Cylinder Unit (new)	AF00500
2	Roller Diaphragm (2x)	M29664
3	Lip Seal, Patient Gas Outlet	M27721
4	Lip Seal, B1	8404065
5	Lip Seal, C1	8404065
6	Lip Seal, Scavenger Connection (thru heater)	M27721
7	Lip Seal, Pneumatic Interface (5x)	8404065
8	Hex wrench	1640623
9	Safety Plate (part of piston coupling asm on motor drive unit)	M29663
10	Screwdriver, Piston-Cylinder	7900864


SV00190
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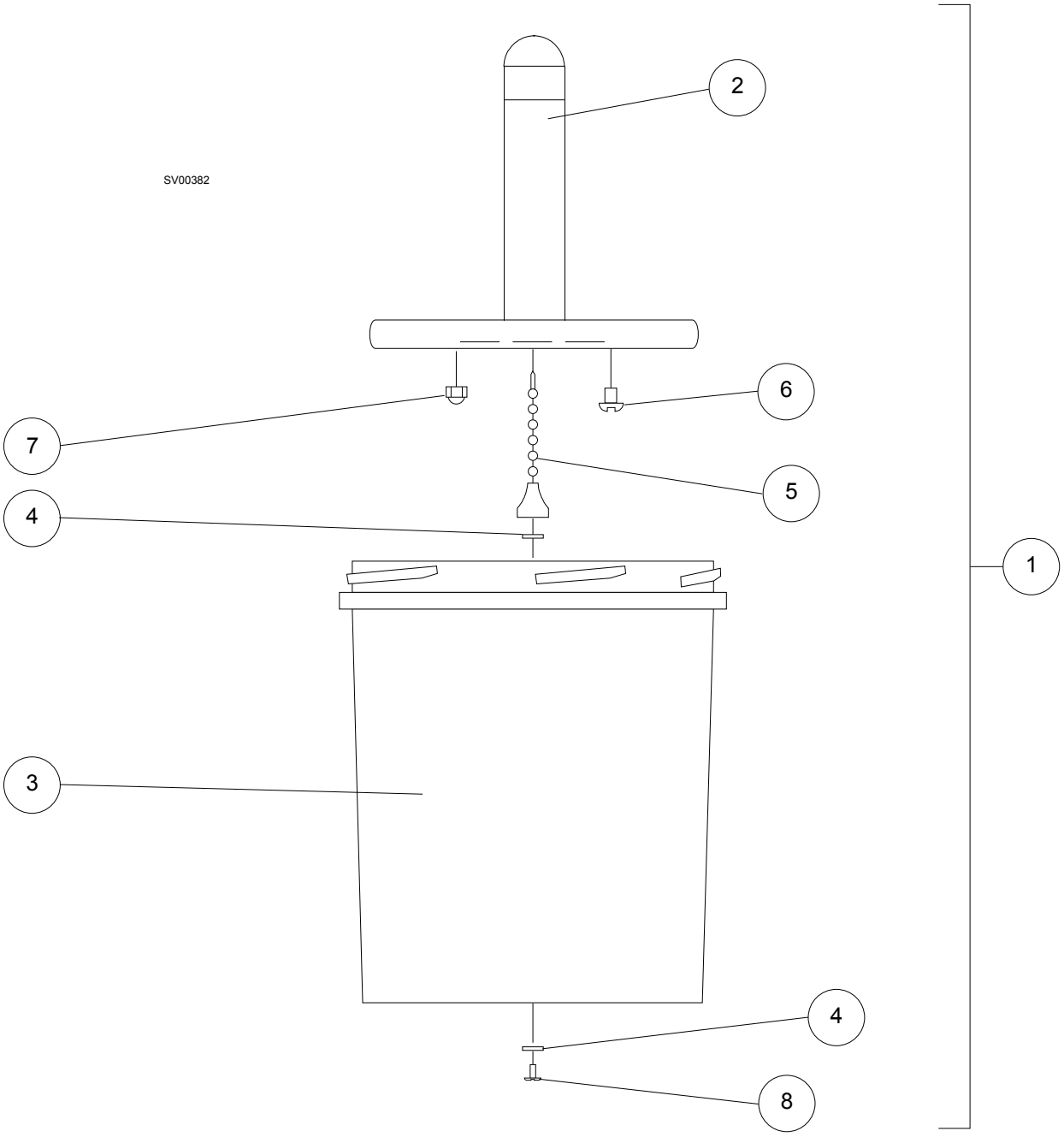
CPU - STANDARD 2

ITEM	DESCRIPTION	PART NUMBER
1	Divan Body (incl. PCBs, motor drive, chassis) (service exchange)	SE4114860
	Divan Body (incl. PCBs, motor drive, chassis) (new)	4114860
2	Motherboard PCB Assembly (not serviceable, listed for reference only)	8201661
3	9V Battery	8301856
4	CPU 2 PCB Assembly (marked “LP-CPU”) (service exchange)	SE8200990
	CPU 2 PCB Assembly (marked “LP-CPU”) (new)	8200990
	EPROM, Divan CPU 2, Software Version 7.40	4116983-002
5	ADDA PCB Assembly (new)	8200970
6	CPU 1 PCB Sub-assembly (marked “CPU STANDARD 2”) (service exch	SE8604038
	CPU 1 PCB Sub-assembly (marked “CPU STANDARD 2”) (new)	8604038
7	Dallas time clock	4117191
8	Lithium Battery, 3.6 V	1817582
	EPROM, Divan CPU 1, Software Version 7.40	4116983-001
	Jumper, 2-pin	1814508
	“Replace By” label, sheet of 100	4116949
9	Kit, Writing Top Assembly, scratch resistant.	4116390
10	Divan Front Panel Assembly (service exchange).	SEAF00486
	Divan Front Panel Assembly (new)	AF00486
11	Divan Control Knob.	M29954
12	Control Panel, membrane	AF00361
13	Panel LED & bargraph PCB.	8201090
14	Display PCB with alphanumeric displays	8202021
15	Alphanumeric display (2x)	1827456
16	Pulse Generator.	8200957
	Not Shown: Kit, Divan software 7.40	4117024


SV00382
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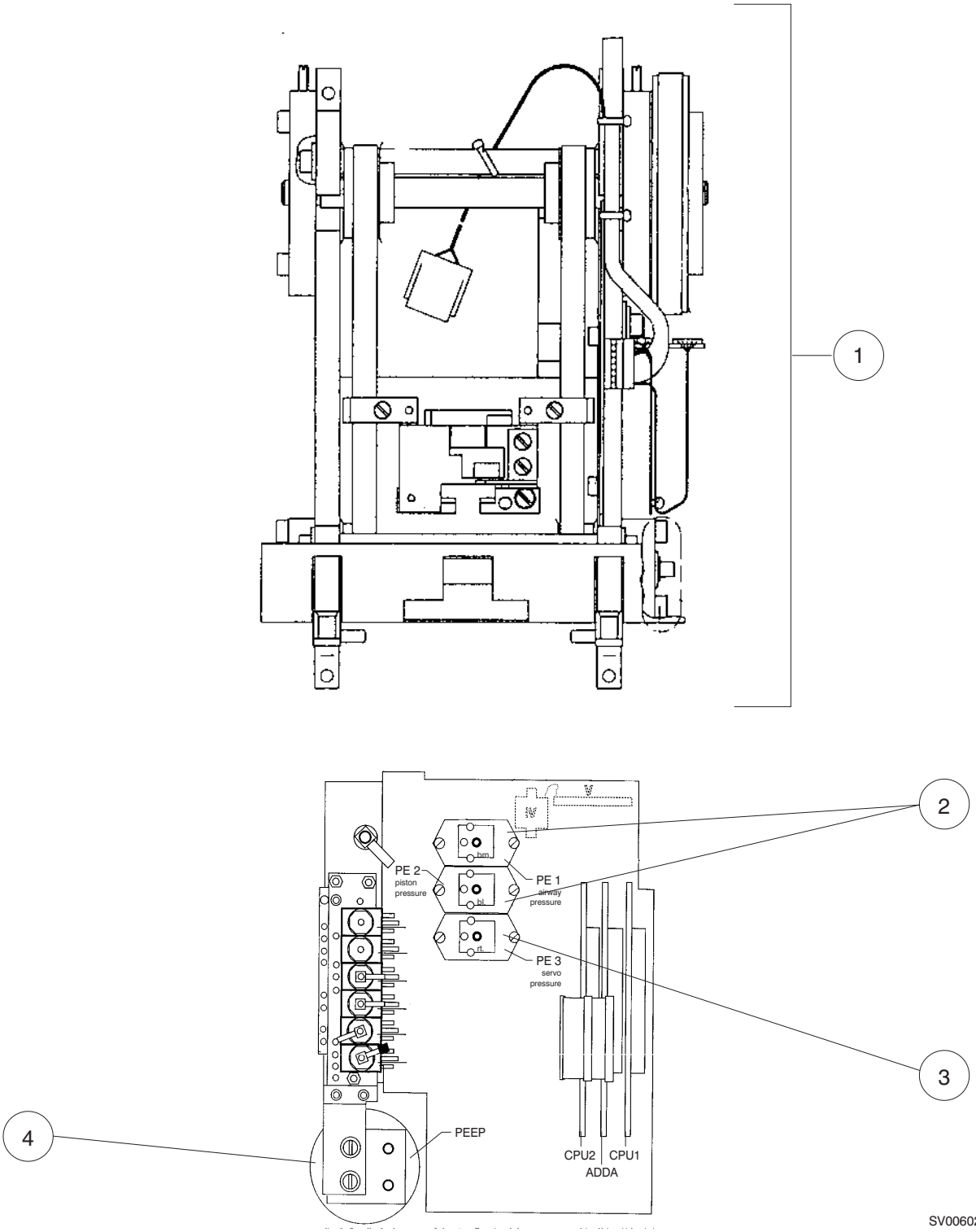
ITEM	DESCRIPTION	PART NUMBER
1	Canister assembly	M29320

NOTE: The canister is replaced as a complete assembly. The following parts are listed for reference only.

2	Canister insert (diffuser)	M29999
3	Canister	M29994
4	Packing ring (2x)	M30563
5	Bead chain	M30562
6	Screw, AM 4x6 DIN 85-A4	1315838
7	Nut, M 4 DIN 1587-M, A4/051 NG	1334751
8	Screw, M 4x8 DIN 921-A2	1336029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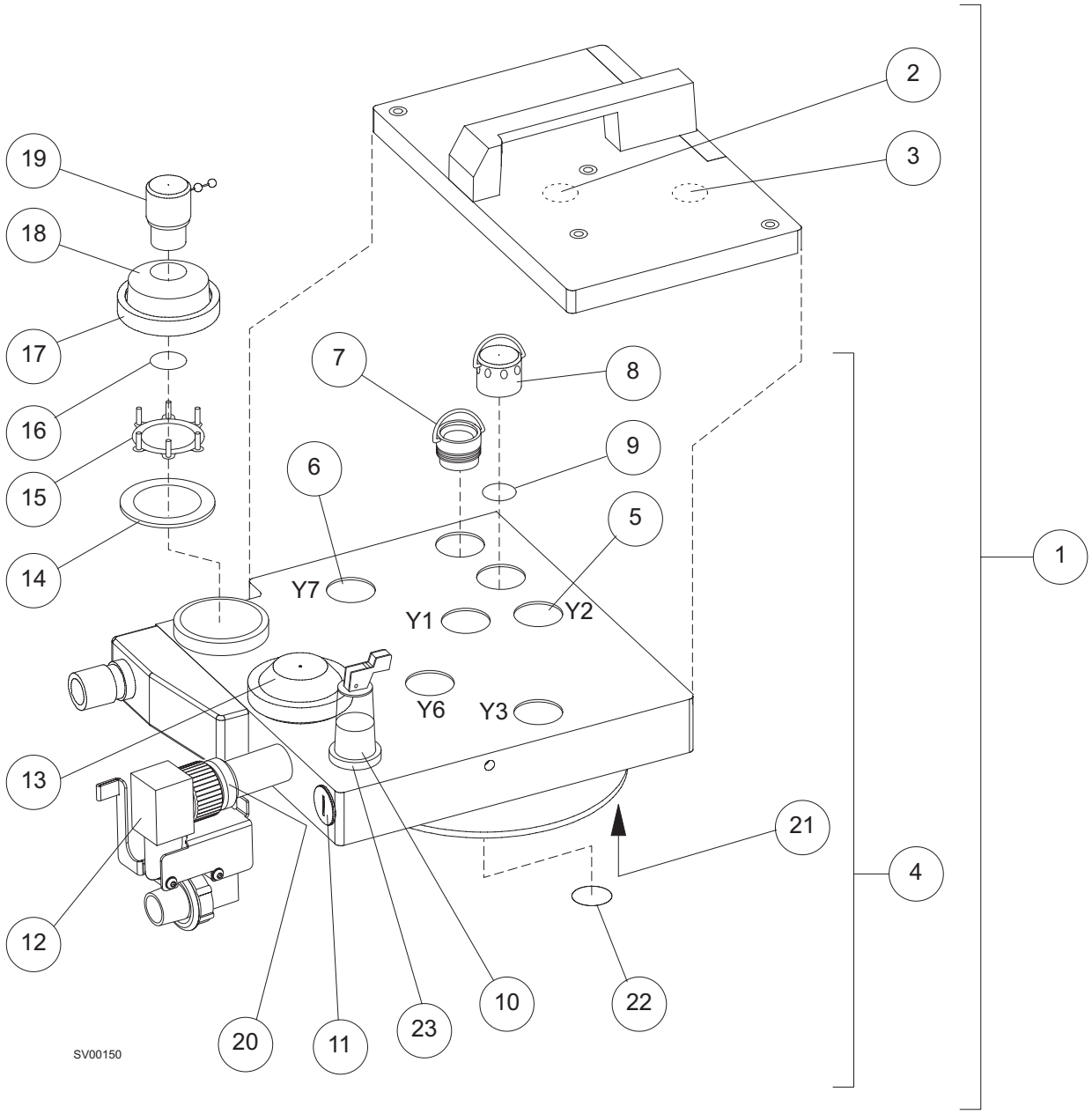
PE 2
piston
pressure
PE 1
airway
pressure
PE 3
servo
pressure
PEEP
CPU2
CPU1
ADDA
SV00602

ITEM	DESCRIPTION	PART NUMBER
1	Divan Motor Drive Assembly (new)	M31461
	Divan Motor Drive Assembly (RAT*)	M31867
2	Pressure sensor, PE1 & PE2	8200599
3	Pressure sensor, PE3	8200785
4	PEEP valve	8406516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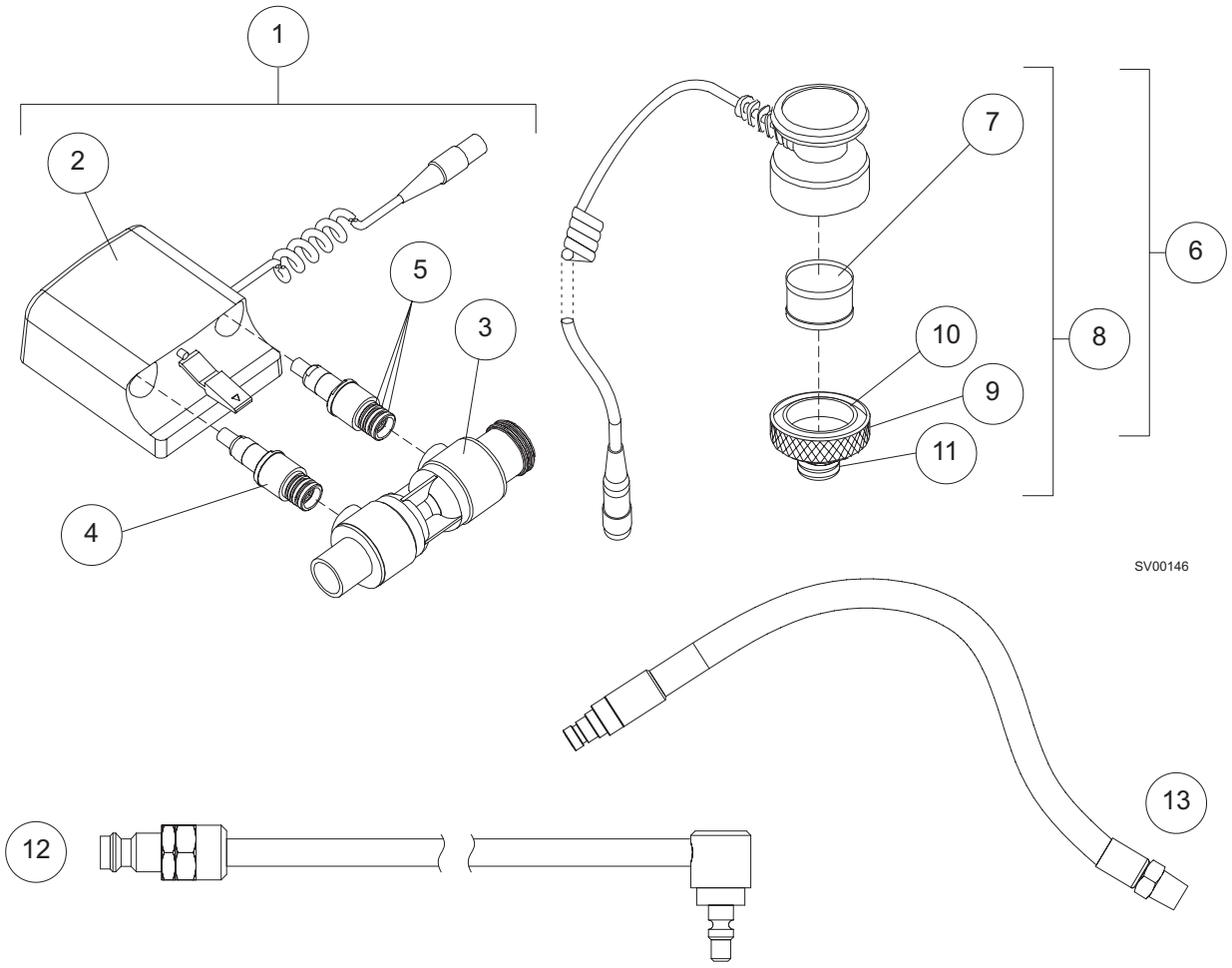
SV00150

ITEM	DESCRIPTION	PART NUMBER
1	Breathing System: Complete Assembly (service exchange)	SE4114852
	Breathing System: Complete Assembly (new)	4114852
2	Diaphragm membrane, sealing washer)	8410181 and 8407979
3	Valve Diaphragm, Y1, Y2 and Y3	M30462
4	Breathing System Block	M32899
5	Valve Seat, Y1, Y2 and Y3	M30393
6	Valve Seat, Y6 and Y7	M30402
7	Check Valve	M32458
8	Air Inlet Valve	M32459
9	O-ring	2M08777
10	APL Valve (service exchange)	SEAF00395
	APL Valve (new)	AF00395
11	Plug	4114533
12	Flow Sensor Mount Assembly	4114742
	Anti-rotation bracket	4115603
	Bracket spacer (2x)	4115602
	Screw, 6-32 x 3/16 in. btn hd skt (4x)	HW09095
	Lock washer, #6 int-t (4x)	HW67007
	O-ring (neoprene)	4112619-011
	Nut, safelock connector	4114446
13	Expiratory Valve Dome	2109230
14	Gasket (2x)	2109231
15	Valve Seat w/Pins (2x)	M30413
16	Valve Disk (2x)	2123249
17	Retaining Ring (2x)	M30453
18	Inspiratory Valve Dome and Label	4108329
19	Plug Assembly	4110507-001
20	O-ring (neoprene)	4112619-011
21	Lip Seal	M30455
22	Packing Ring	M30456
23	Union Nut	M30448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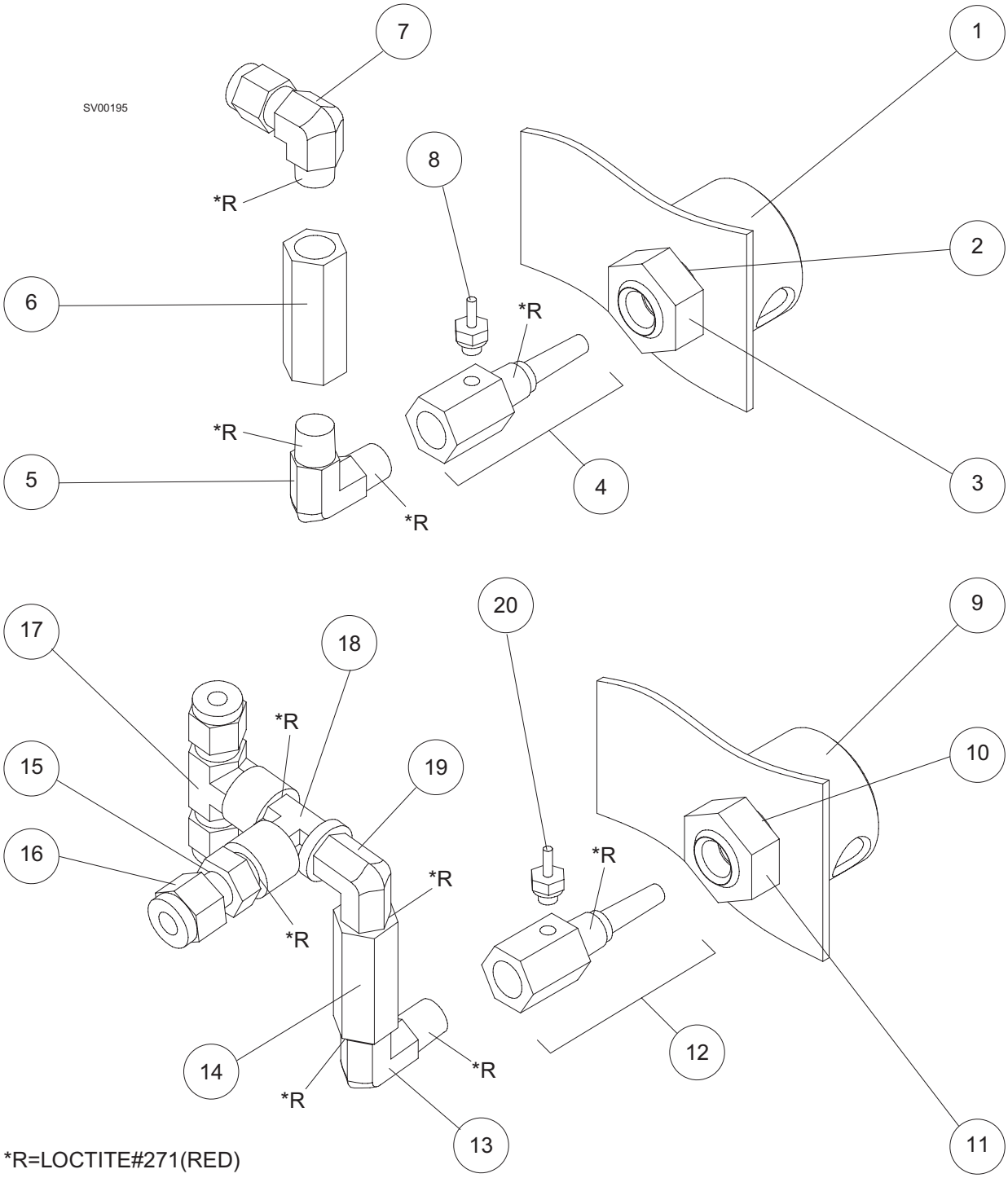
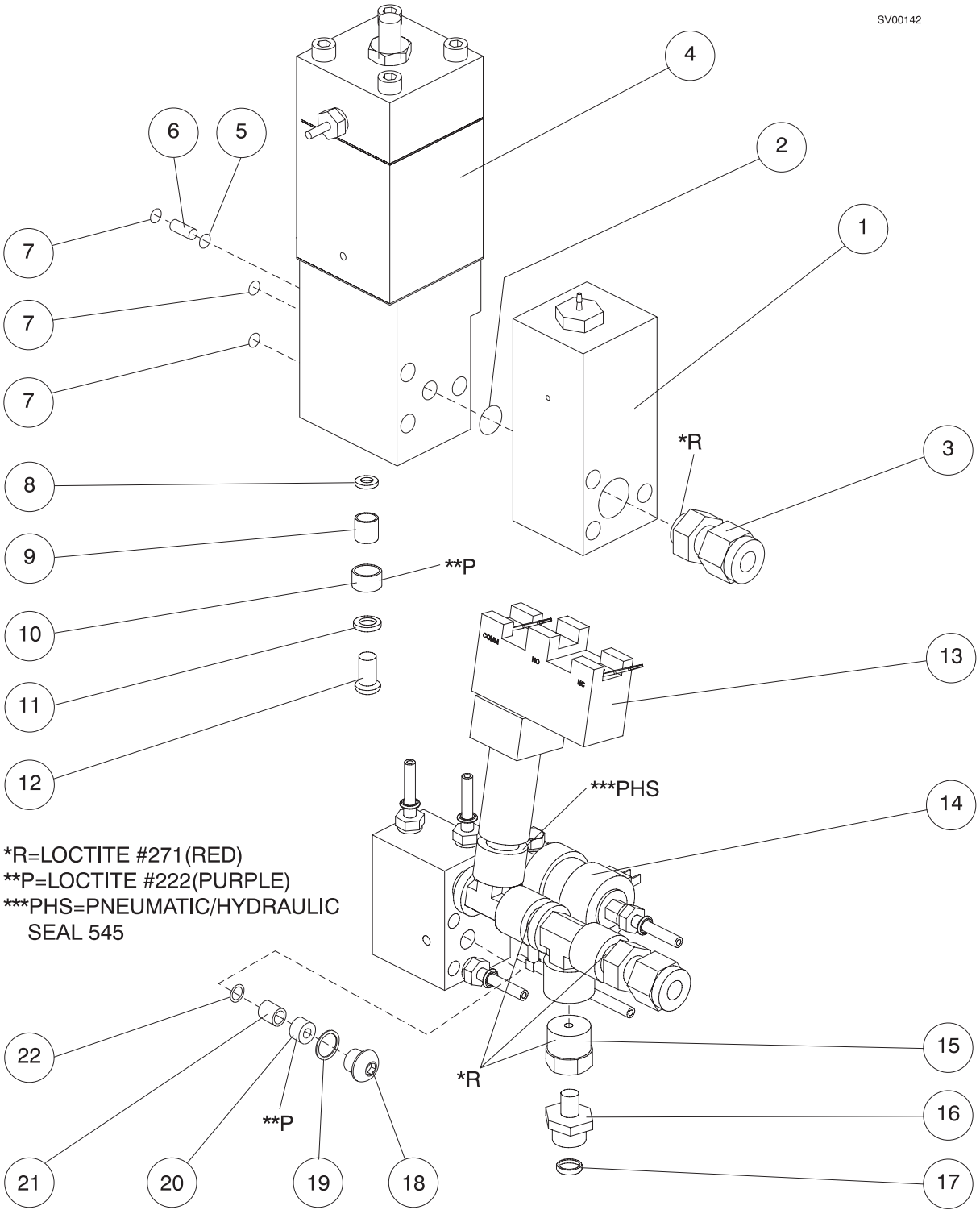
SV00146

ITEM	DESCRIPTION	PART NUMBER
1	Ultrasonic Flow Sensor Assembly (service exchange)	SE4115754-001
	Ultrasonic Flow Sensor Assembly (new)	4115754-001
2	Electronics Housing (ref only, not a spare part)	4114443
3	Flow Housing	4114444
4	Transducer - set of two, incl. O-rings	4114445
5	O-ring, set of six	4115147
6	Oxygen Sensor: Complete Assembly, including capsule	4110374
7	Sensor Capsule (old number: 6803290)	6850645
8	Housing Assembly, less capsule (new)	4106363
	Housing Assembly, less capsule (Service Exchange)	SE4106363
9	Adapter (cover)	4106385
10	O-ring, #025 (viton)	4105791
11	O-ring, #016 (viton) (2x)	4106388
12	Breathing Pressure Hose Assembly	4114783
13	Fresh Gas Hose Assembly	4114580



*R=LOCTITE#271(RED)

ITEM	DESCRIPTION	PART NUMBER
	Pipeline Inlets, O_2 and Air (typ.)	
1	Inlet Housing	4113974
2	Lock Washer, 5/8 int-t	HW67001
3	Jam Nut, 5/8-18	HW52002
4	Inlet Filter Assembly	4115083
5	L-fitting, 1/8 MPT x 1/8 MPT	4109409-002
6	Check Valve, MJCV-1	4105815
7	L-fitting, ¼ tube x 1/8 MPT	4109410
8	Hose Barb, 1/16 x 10-32 M w/seal	4112707-001
	Pipeline Inlet, N_2O	
9	Inlet Housing	4113974
10	Lock Washer, 5/8 int-t	HW67001
11	Jam Nut, 5/8-18	HW52002
12	Inlet Filter Assembly	4115083
13	L-fitting, 1/8 MPT x 1/8 MPT	4109409-002
14	Check Valve, MJCV-1	4105815
15	Straight Fitting, ¼ tube x 1/8 MPT	4109408
16	Plug, ¼ tube	4103072
17	T-fitting, ¼ tube x ¼ tube x 1/8 MPT	4109406
18	T-fitting, 1/8 MPT x 1/8 MPT x 1/8 MPT	4102760
19	L-fitting, 1/8 MPT x 1/8 FPT	4103513
20	Hose Barb, 1/16 x 10-32 M w/seal	4112707-001


SV00142
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***PHS
14
*R=LOCTITE #271(RED)
**P=LOCTITE #222(PURPLE)
***PHS=PNEUMATIC/HYDRAULIC
SEAL 545
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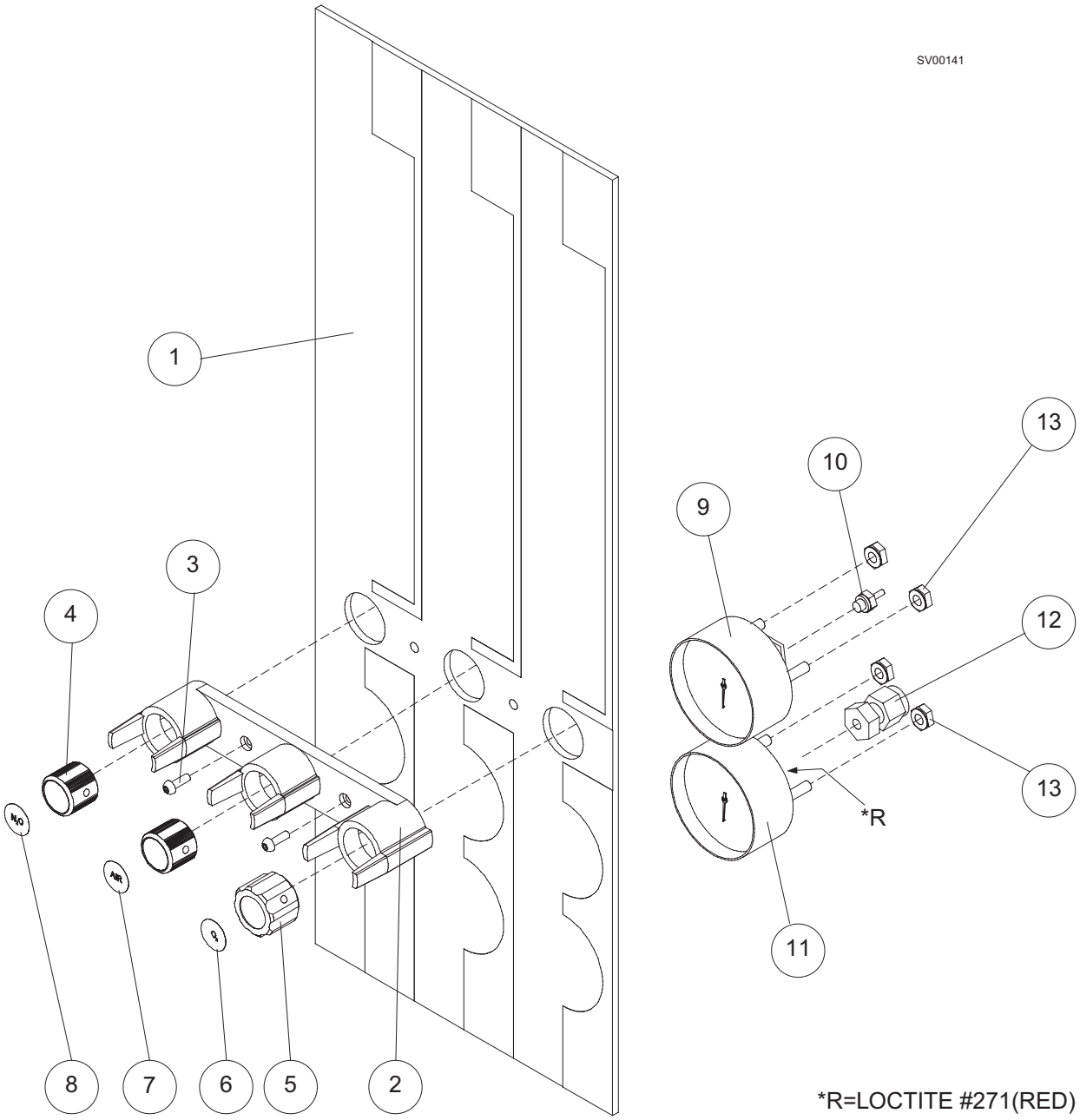
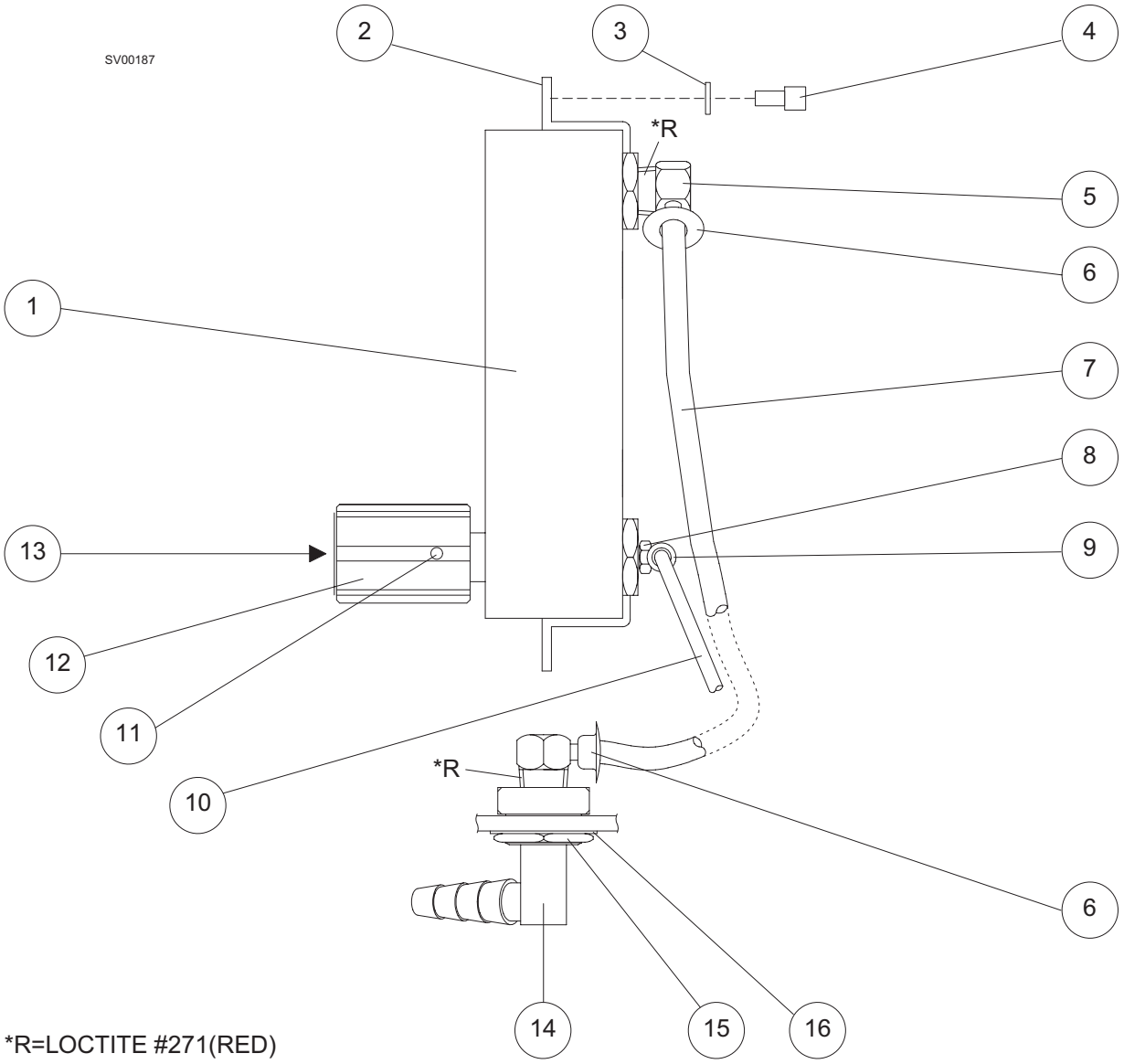
ITEM	DESCRIPTION	PART NUMBER
1	Failsafe Block Assembly (typ: Air and N_2O)	4114031
2	O-ring, #105 (neoprene)	4111893
3	Straight fitting, ¼ tube x 1/8 MPT	4109408
4	ORC Assembly (service exchange)	SE4114277-001
	ORC Assembly (new)	4114277-001
5	O-ring, 0.166 x 0.042 (buna-n)	4111894
6	Filter	4111805
7	O-ring, #105 (neoprene) (3x)	4111893
8	O-ring, 0.178 ID (neoprene)	4112619-013
9	Restrictor, purple	4110738-008
10	Plug	4114539
11	O-ring, 0.313 ID (neoprene)	4112619-012
12	Screw, 5/16-24 x 1/4 in. btn hd skt	HW09088
13	O_2 Supply Pressure Switch	4106037
14	Min. O_2 Flow Cutoff Solenoid	4110906
15	Adapter, ISO 228 to 1/8 MPT	4114607
16	Fitting, Pilot to Divan	M28816
17	Ferrule, Pilot to Divan	M30963
18	Screw, 5/16-24 x 1/4 in. btn hd skt	HW09088
19	O-ring, 0.313 ID (neoprene)	4112619-012
20	Plug	4114539
21	Restrictor (brown)	4110738-007
22	O-ring, 0.178 ID (neoprene)	4112619-013



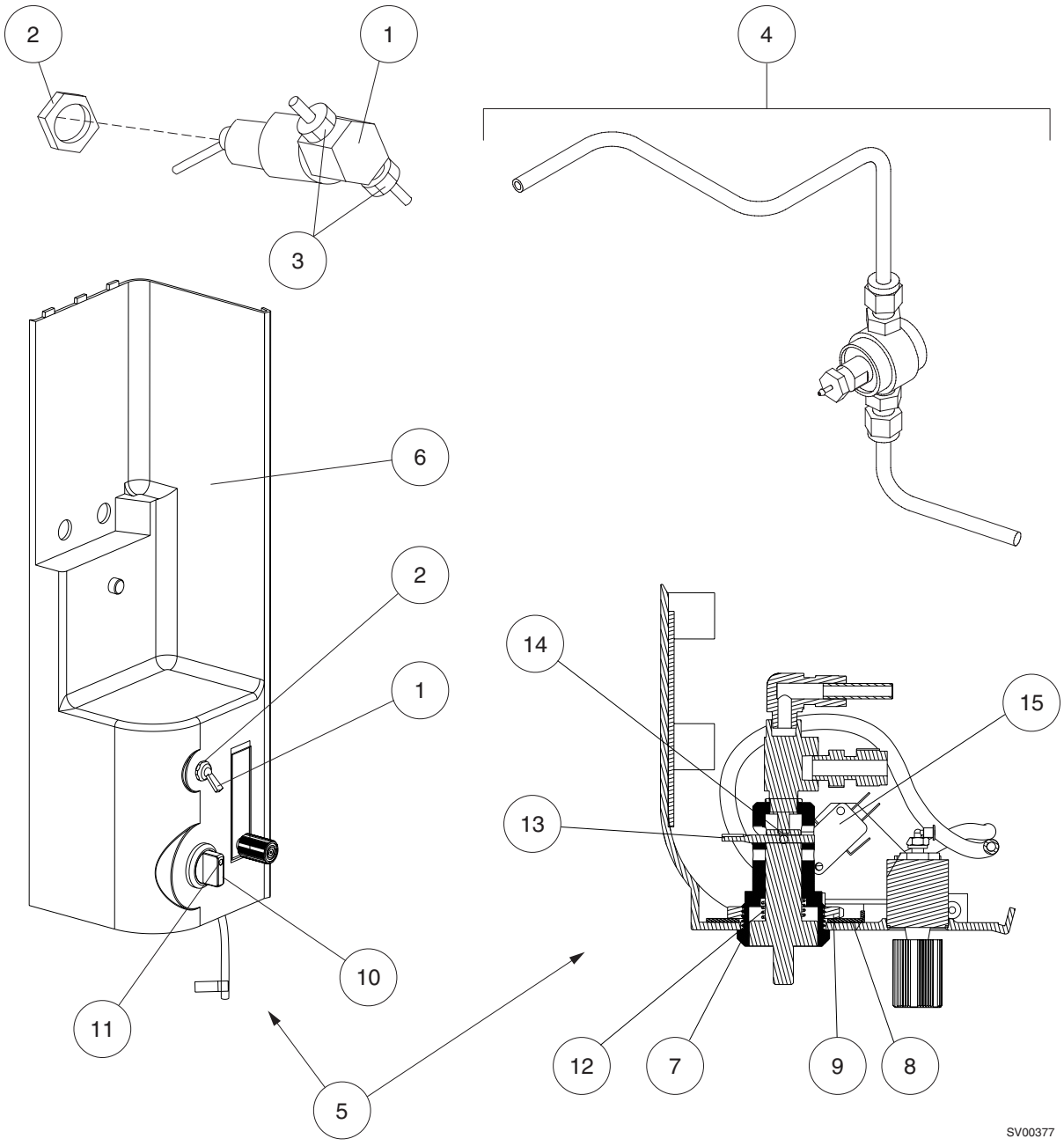
*R=LOCTITE #271(RED)

ITEM	DESCRIPTION	PART NUMBER
1	Flowmeter Shield w/ Air Cylinder	4114559-001
	Flowmeter Shield w/ Air Cylinder CSA	4114559-003
	Flowmeter Shield w/ N_2O Cylinder	4114559-002
	Flowmeter Shield w/ N_2O Cylinder CSA	4114559-004
2	Knob Guard	4110574-001
3	Screw, 6-32 x 7/16 in. btn hd skt (2x)	HW09017
4	Knob, flow (2x)	4103736
5	Knob, O_2 flow	4103156
6	Label, 5/8 dot O_2 green	4103178
7	Label, 5/8 dot Air yellow	4103905
8	Label, 5/8 dot N_2O blue	4103904
9	Gauge, 100 psi (3x)	4110575-005
10	Hose barb fitting, 1/16 x 10-32M (1x ea. pipeline press. gauge)	4112702-001
11	Gauge, 3000 psi (2x)	4110575-006
12	Straight fitting, 3/16 tube x 1/8 FT (1x ea. cyl. press. gauge)	4109402
13	Kep nut, 10-32 (2x ea. gauge)	HW55002



*R=LOCTITE #271(RED)

ITEM	DESCRIPTION	PART NUMBER
1	Auxiliary O_2 Flowmeter	4111460
2	Z-bracket (2x)	4114455
3	Lock washer, #6 int-t (2x)	HW67007
4	Screw, 6-32 x 3/8 in. cap skt hd (2x)	HW01008
5	L-fitting, 1/8 hose x c MPT (2x)	4111445
6	Press-on hose clamp (2x)	4111495
7	Hose, 0.13 in. ID, 10 in.	ML08007
8	L-fitting, 1/16 hose x 8-32M	4110173
9	Press-on hose clamp	4104161
10	Hose, 0.075 in. ID, 7in	ML08003
11	Set Screw, cup point, 6-32 x ¼ in.	HW04003
12	Knob	4111442
13	Label, e w/dot, green & white rings	4109373
14	Bulkhead & hose barb asm	4111440
15	Panel nut, 5/8-32	4111443
16	Lock washer, 5/8 int-t	4111444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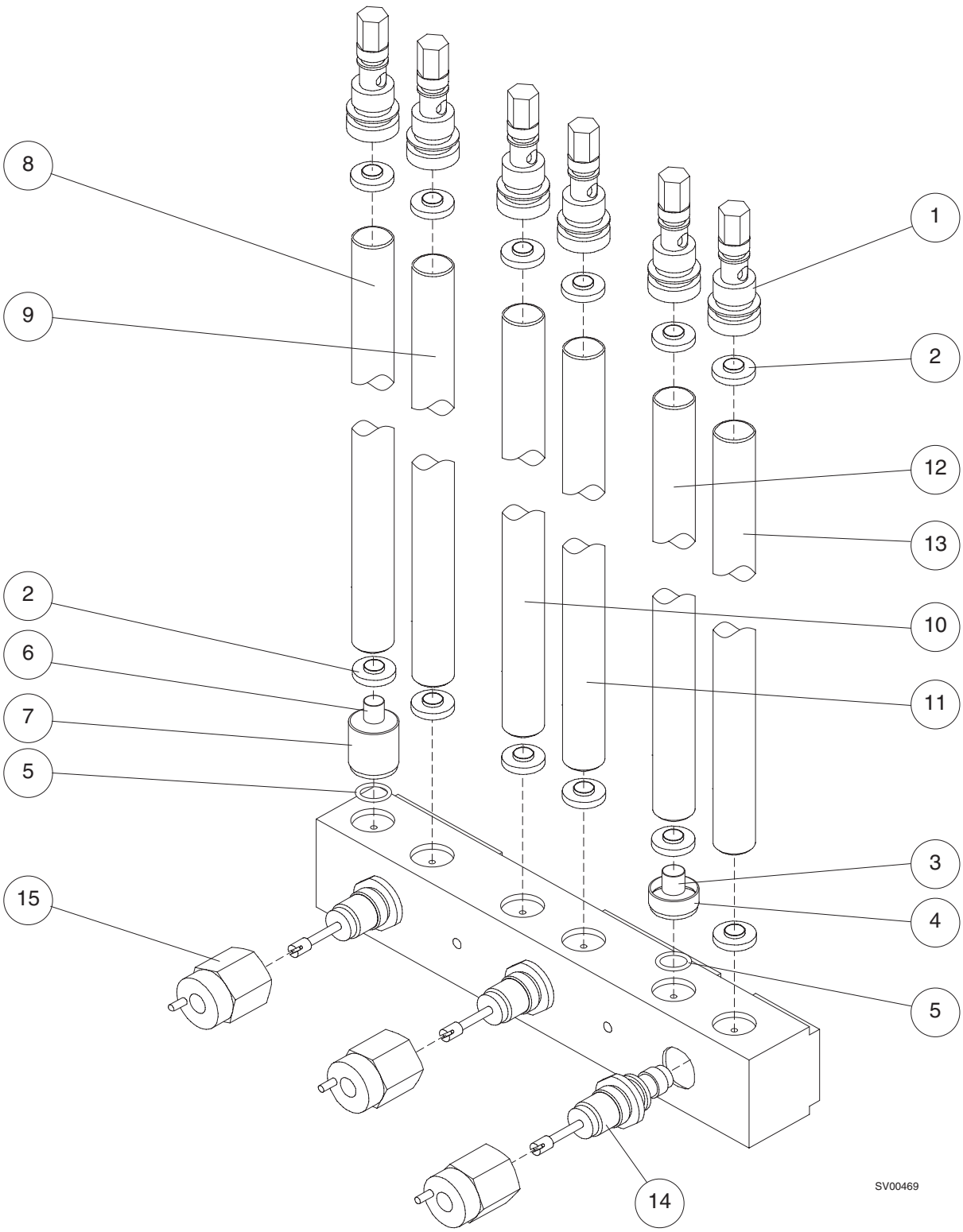
SV00377

ITEM	DESCRIPTION	PART NUMBER
1	Valve, 3-way toggle (suction switch)	4114648
2	Nut, dress black	4114649
3	Hose barb fitting, straight, 1/16 ID x 10-32 M (2x)	4112707-001
4	Vacuum on/off valve assembly	4114713
5	Cockpit sub-assembly (includes Items 6 thru 9)	4117542
6	Cockpit FRONT cover	4114461
7	Knob housing	4106045
8	Lock Washer, 1-3/8	4111729
9	Jam nut, 1-3/8 x 20	4104351
10	Knob, main switch	4106044
11	Label, small white dot	4103423
12	Spring, 0.709 O.D. x 1-1/2 in.	4110975-013
13	Cam, main switch actuator	4106043
14	Set screw, cup pt, 8-32 x 3/16 in. (2x)	HW04006
15	Switch, electric	4113735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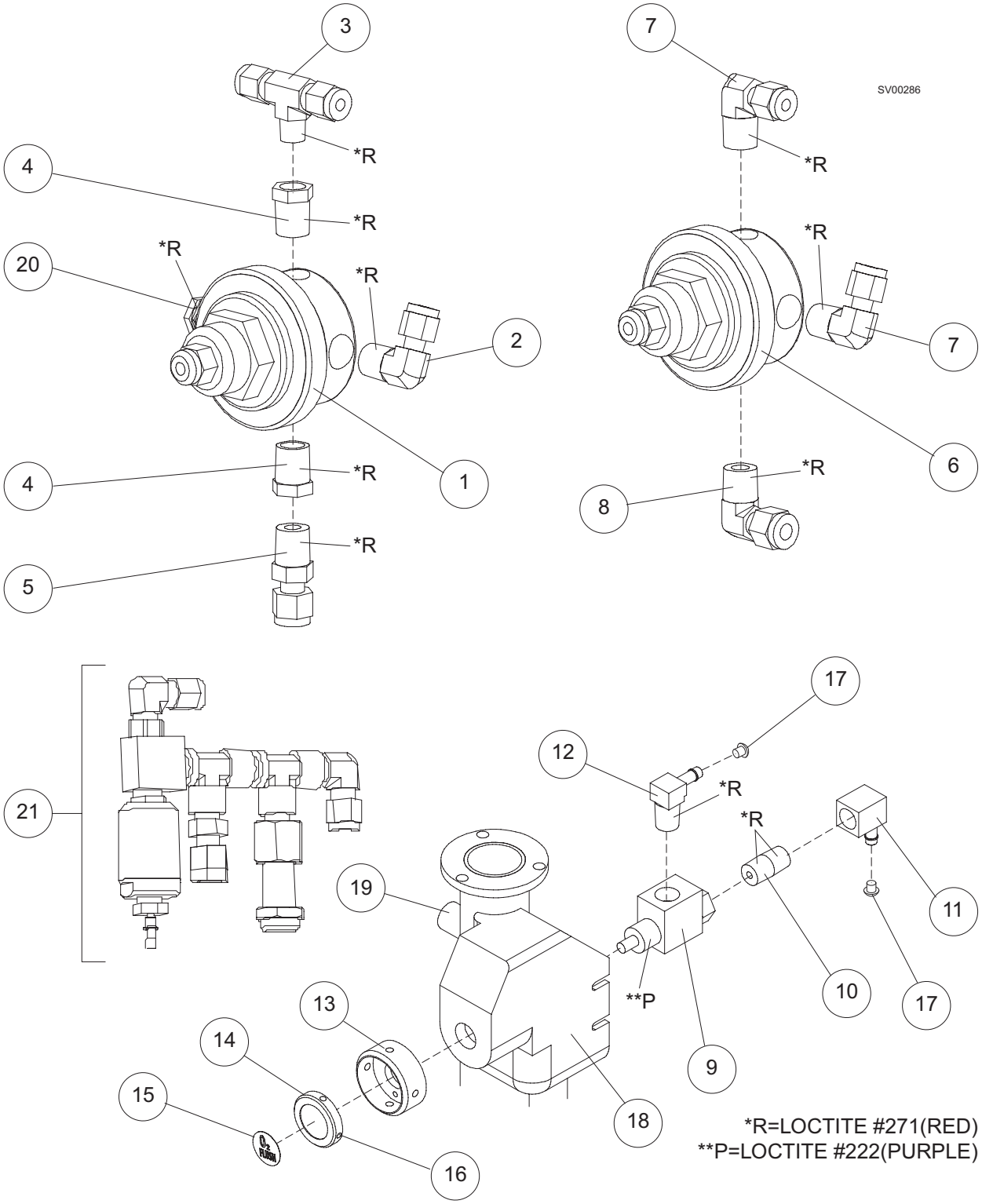
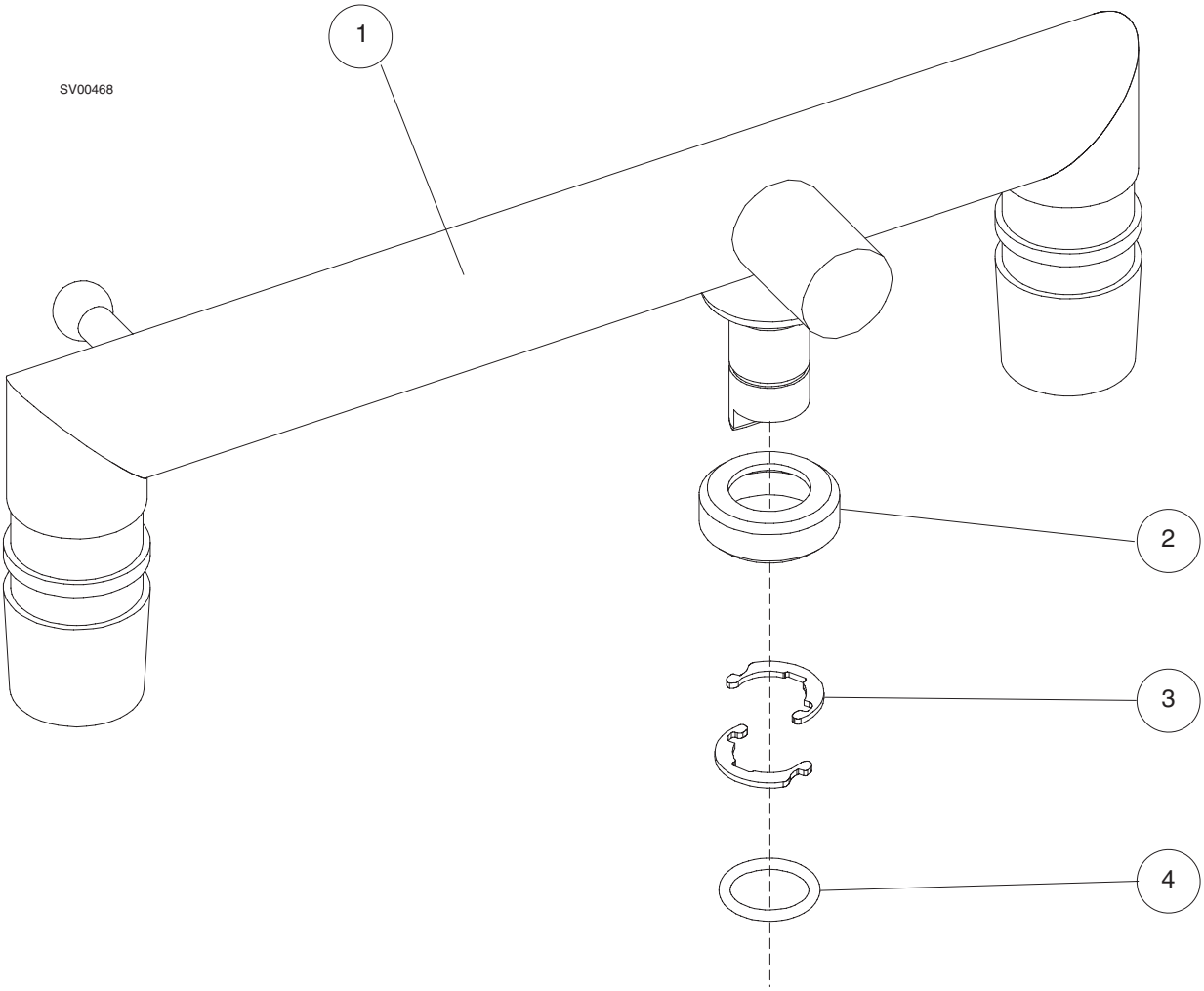
SV00469

ITEM	DESCRIPTION	PART NUMBER
1	Upper flow tube seat (connector) (O-rings supplied with part)	4102506
2	Gasket, large (2x per flow tube)	4102724
3	O_2 Restrictor, Red	4110738-003
4	O_2 restrictor housing	4103440
5	O-ring, #010 (neoprene)	4101872
6	N_2O Restrictor, Black	4110738-005
7	N_2O restrictor housing	4111716
8	Flow Tube, N_2O, 20 - 500 mL	4112563-001
9	Flow Tube, N_2O, 0.6 - 10 L	4112564-001
10	Flow Tube, Air, 100 - 1000 mL	4112565-001
11	Flow Tube, Air, 1 - 10 L	4112566-001
12	Flow Tube, O_2, 20 - 500 mL	4112567-001
13	Flow Tube, O_2, 0.6 - 10 L	4112568-001
14	Flow control valve (3x) (O-rings supplied with part)	4114036
15	Stop pin nut (3x)	4111892

SPARE AND REPLACEMENT PARTS (continued) **NM6000**



ITEM	DESCRIPTION	PART NUMBER
	O_2 Cylinder Pressure Regulator:	
1	O_2 Regulator	4103590
2	L-fitting, 3/16 tube x ¼ MPT	4109409-001
3	T-fitting, 3/16 tube x 3/16 tube x 1/8 MPT	4109404
4	Straight fitting, ¼ MPT x 1/8 FPT	4102906
5	Straight fitting, ¼ tube x ¼ MPT	4110477
	N_2O Cylinder Pressure Regulator:	
6	N_2O Regulator	4103591
7	L-fitting, 3/16 tube x ¼ MPT	4109409-001
8	L-fitting, ¼ tube x ¼ MPT	4109401
	AIR Cylinder Pressure Regulator (same as N2O assembly except for regulator):	
6	O_2 Regulator	4103590
7	L-fitting, 3/16 tube x ¼ MPT	4109409-001
8	L-fitting, ¼ tube x ¼ MPT	4109401
	O_2 Flush Valve:	
9	Clippard valve	4103340
10	Nipple, 1/8 NPT x ¾ in	4102782
11	L-fitting, 0.156 ID hose x 1/8 FPT	4103443
12	L-fitting, 0.156 ID hose x 1/8 MPT	4114871
13	Guard ring	4103248-001
14	Button	4103249
15	Label, 5/8 dot O_2 Green	4112801-001
16	Set screw, 3-48 x 3/16 cup pt (2x)	HW04020
17	Eyelet (press-on hose clamp) (2x)	4111495
18	Support assembly, Divan	4114512
19	Button hd screw (replaces shunt plug)	HW09079
	CSA Items:	
20	Relief Valve, 70 psi (each regulator)	4110364
21	Cylinder Cutoff Valve Assembly (typical)	4116462


SV00468
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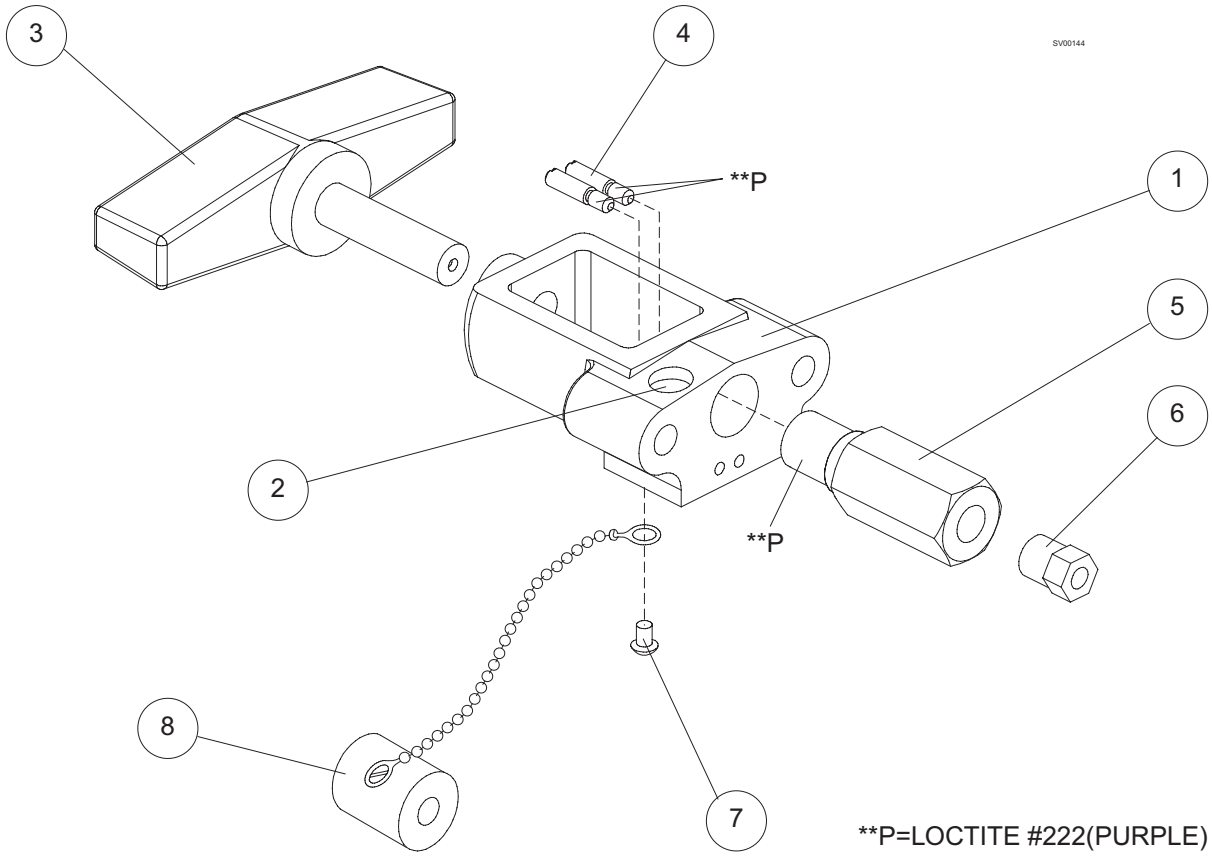
ITEM	DESCRIPTION	PART NUMBER
	Bag Arm Assembly	4114705
1	Head, bag mount w/test port	4117154
2	Nut, bag arm	4114862
3	Retaining ring (2x)	4114863
4	Purple O-ring, #014 (EPDM)	4112619-020
	Bag pole locking knob	4115758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SV00144
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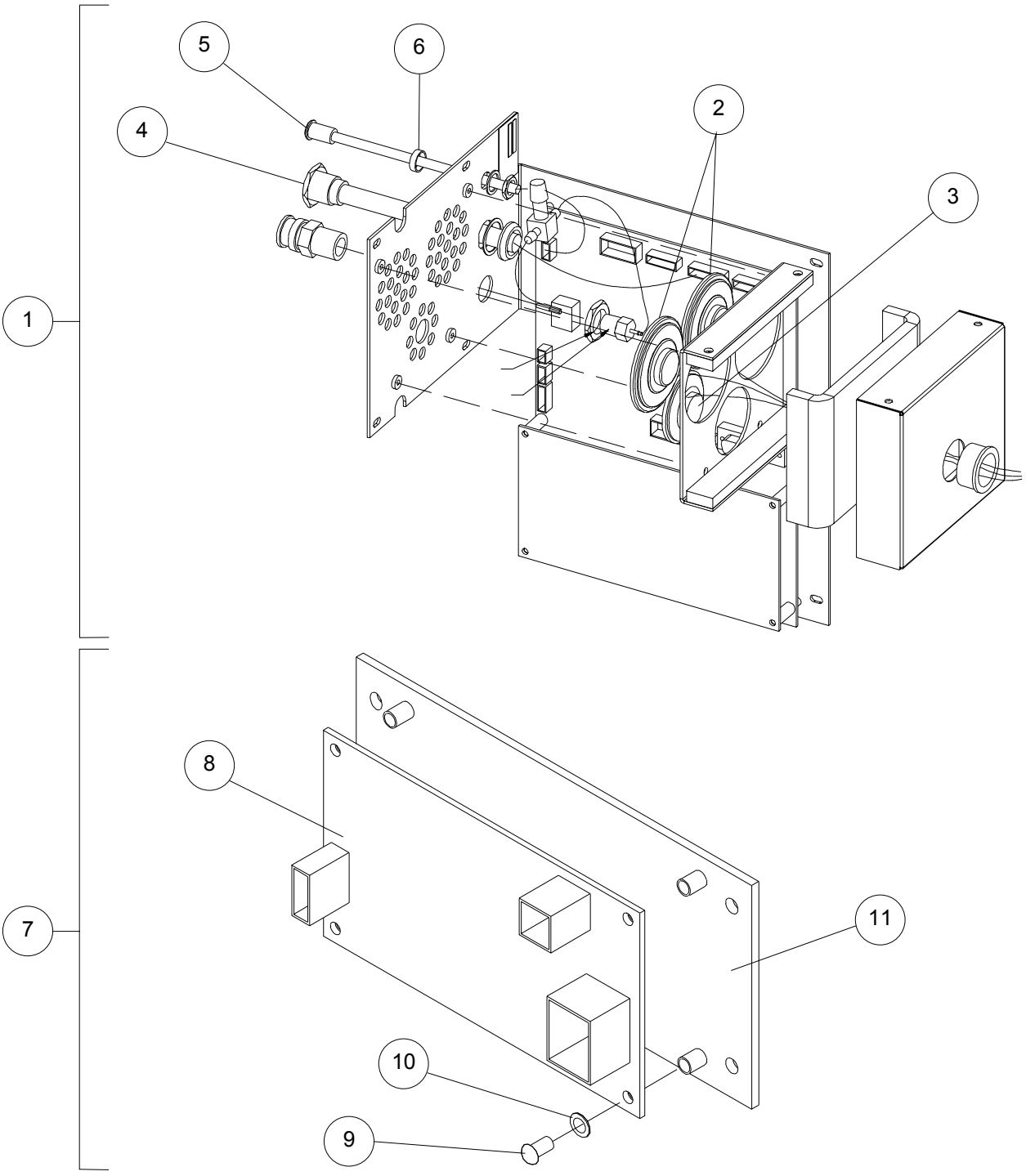
**P=LOCTITE #222(PURPLE)

ITEM	DESCRIPTION	PART NUMBER
1	Yoke, O_2 (2x)	1101620
	Yoke, N_2O	1101621
	Yoke, Air	1101625
2	Label, O_2, 3/8 dot O_2 Green (2x)	1101768
	CSA White	4103890
	Label, N_2O, 3/8 dot N_2O Blue	1101619
	Label, Air	4102742
	CSA Black/White	4103826
	Parts common to all yokes:	
3	Handle	4113536
4	Index pins: screw, sltd, 0.157 OD x 6-32 x 0.718 L (2x per yoke)	4105929
5	Check valve assembly	4111792
6	3/16 tube nut	4104716
7	Screw, 10-32 x 3/8 in. rd hd sltd	HW06006
8	Plug assembly	4112755-001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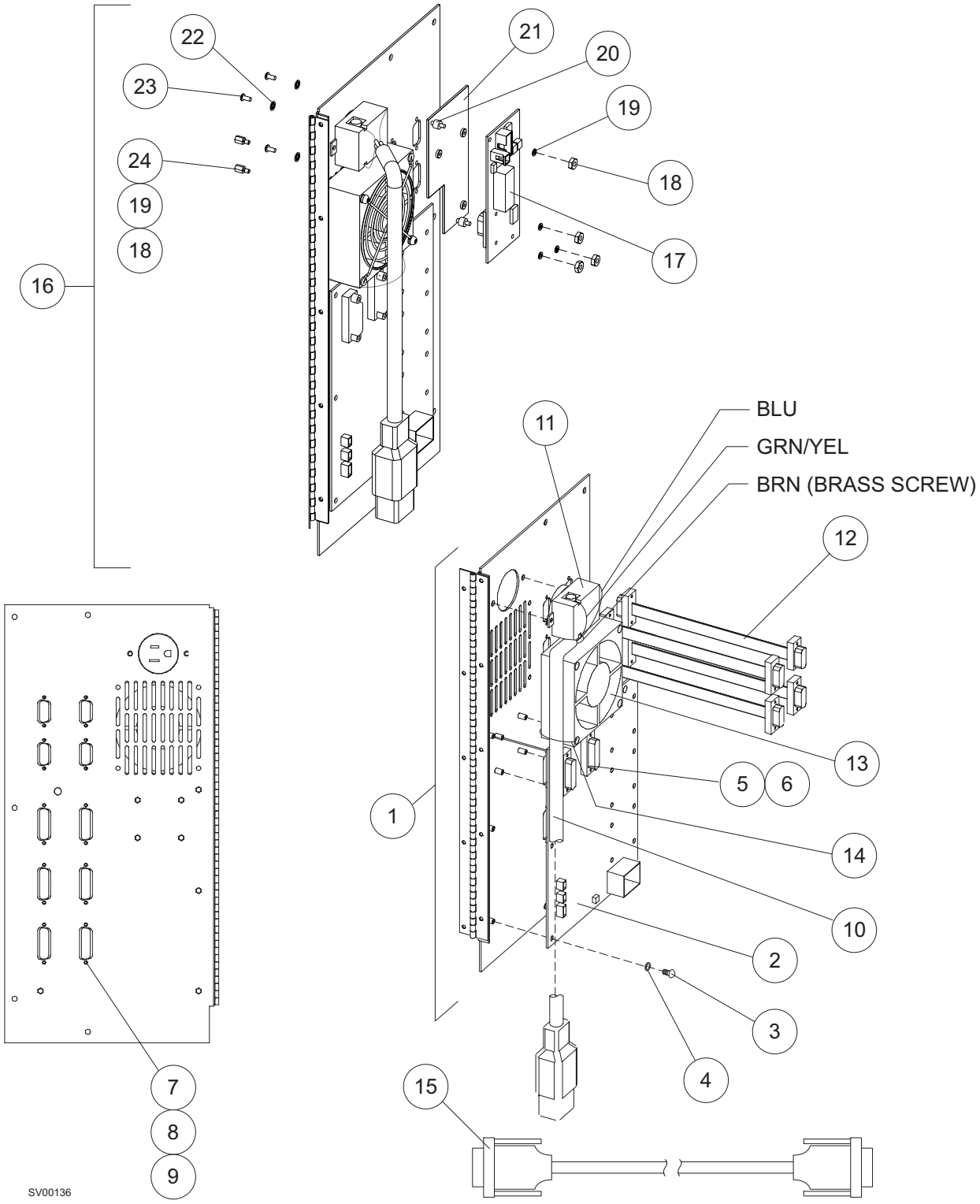
ITEM	DESCRIPTION	PART NUMBER
1	VPO Assembly (service exchange)	SE4114466
	VPO Assembly (new)	4114466
2	Speaker assembly (2x)	4113064-001
3	Speaker Assembly	4114845
4	Breathing volume interface assembly	4114503
5	O2 interface assembly	4113909
6	Spacer	4110792-094
7	Interface Assembly	4114842
8	Interface PCB assembly*	4114825
9	Screw, 4-40 x ¼ in. btn skt hd (4x)*	HW09037
10	Lock washer, #4 int-t (4x)*	HW67011
11	Mounting plate*	4114840

* These parts are listed for reference only


22
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17
11
BLU
GRN/YEL
BRN (BRASS SCREW)
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SV00136

ITEM	DESCRIPTION	PART NUMBER

Early design with four com port cables:

1	Vitalbus Assembly (service exchange)	SE4114465
	Vitalbus Assembly (new)	4114465
2	Vitalbus hub PCB assembly*	4114376
3	Screw, 4-40 x ¼ in. (4x)*	HW09037
4	Lock washer, #4 int-t (4x)*	HW67011
5	Spacer, 4-40 x 4-40 x ¼ in. (2x per connector)*	4110589-012
6	Nut, 4-40 (2x per connector)*	HW50002
7	Screwlock, 4-40 x 5/8 in.(2x per connector)*	4111934
8	Lock washer, #4 split (2x per connector)*	HW65000
9	Nut, 4-40 (2x per connector)*	HW50002
10	Power cable assembly*	4114660
11	Receptacle*	4114149
12	Ribbon cable assembly (4x)*	4113760
13	Fan assembly (vitalbus)	4114470
14	Tie Strap, 0.9 W x 4 1/8 L.	4106068
15	Vitalink cable assembly, 96 in.	4110328-004

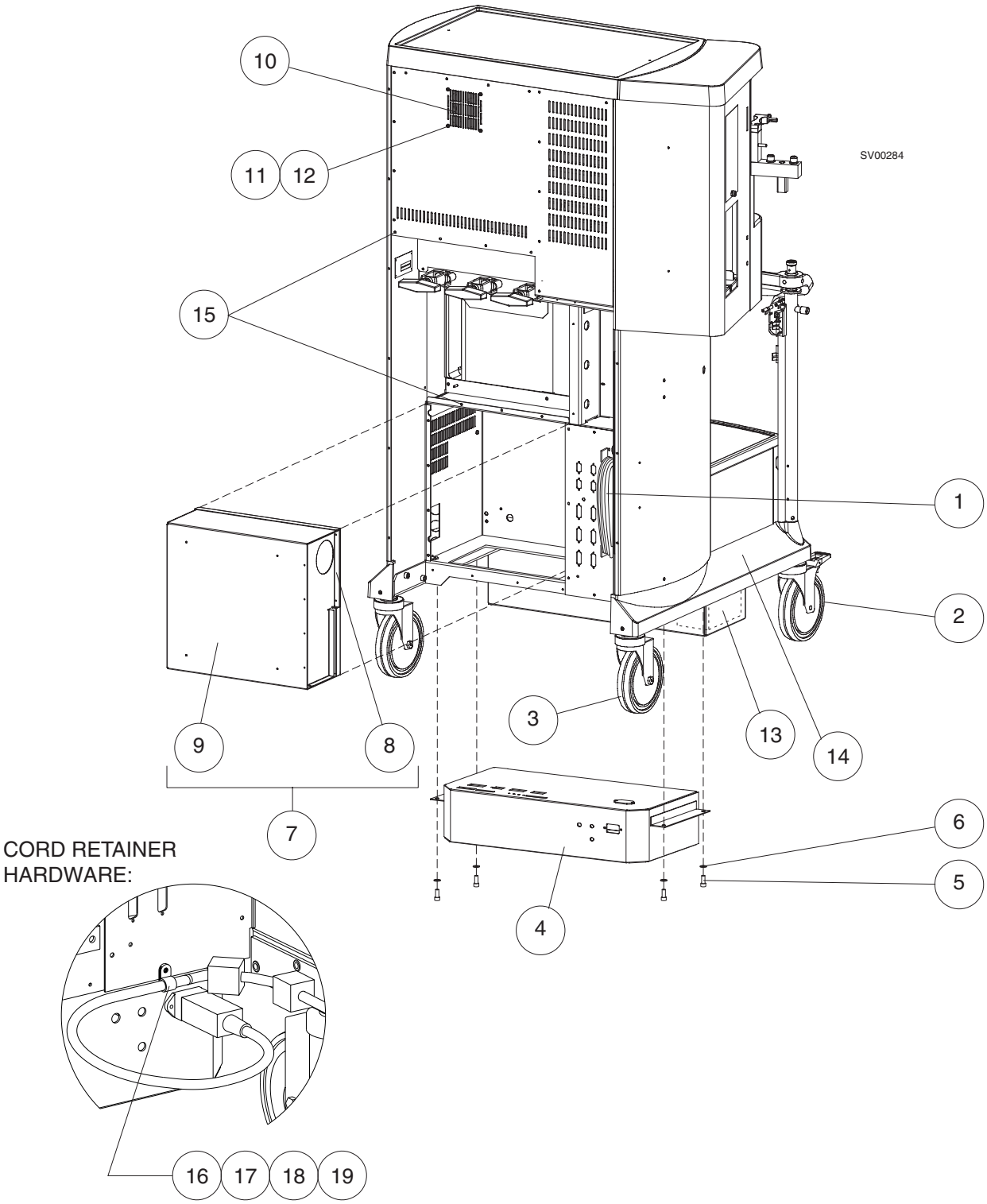
* These parts are listed for reference only

Later design with iso port PCB:

16	Vitalbus Assembly (new)	4116858
	Vitalbus Assembly (Service Exchange)	SE4116858
17	Iso port PCB assembly	4115948
18	Nut, 4-40 hex (6x)	HW50002
19	Lock washer, #4 split (6x).	HW65000
20	Nylon spacer (2x)	4110792-105
21	Bracket	4116863
22	Lock washer, #4 int-t (3x).	HW67011
23	Screw, 4-40 x 1/4 in. btn hd skt (3x).	HW09037
24	Screwlock, 4-40 x 5/8 in.(2x).	4111934

Not shown:

	Cable assembly, iso port J3 to WPU	4116859
	Cable assembly, iso port J2 to WPU	4116861


SV00284
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CORD RETAINER
HARDWARE:
16
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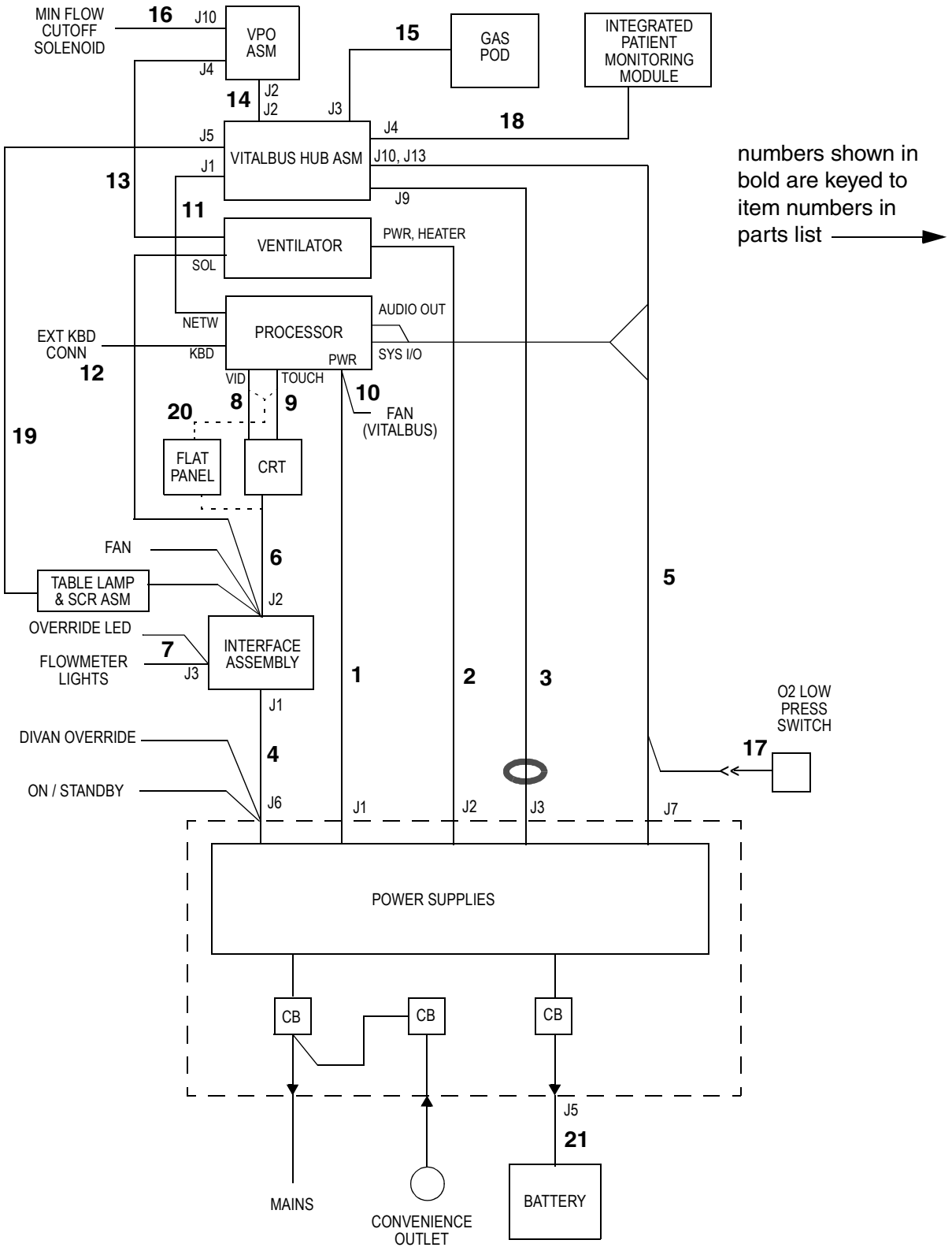
18
19

ITEM	DESCRIPTION	PART NUMBER
1	Power cord assembly, 20 Amp, 15 ft.	4114798
	Power cord assembly w/ferrites, 15 Amp, 15 ft.	4116361
2	Caster w/ brake, 6 in. (2x)	4113006-008
3	Caster w/o brake, 6 in. (2x)	4113006-007
4	Power supply (service exchange)	SE4114431
	Power supply (new)	4116260
5	Screw, ¼-20 - ¾ in. (4x)	HW09048
6	Lock washer, ¼ int-t (4x)	HW67005
7	**WPU 233 MHz (processor) sub-asm (service exch)	SE4115904
7	**WPU 700 MHz (processor) sub-assembly (service exch)	SE4116918
	**WPU 700 MHz (processor) sub-assembly (new)	4116918
8	Plate, WPU mounting*	4114473
9	Computer WK station*	4116725
	Computer WK station* (service exch)	SE4116725
	Attaching hardware (not shown):	
	Screw, 8-32 x 5/16 in. btn hd skt (4x)*	HW09081
	Lock washer, #8 int-t (4x)*	HW67000
	Battery, lithium, 3.0V.	4116144
	Spacer, nylon (4x)	4110792-100
	Keylok asssembly, low flow wizard	4116920-001
	Keylok assembly, air only mode.	4116920-002
	Keylok assembly, lw fl wiz & air only	4116920-003
10	Fan Assembly (CRT display)	4114794
11	Screw, 6-32 x 3/8 btn hd skt (4x)	HW09075
12	Lock washer, #6 int-t (4x)	HW67007
13	Battery, 12 volt rechargeable (4x)	4114674
14	Cover, caster base	4114555
	Drawer Slide, right.	4116952-001
	Drawer Slide, left	4116952-002
15	Back panel Phillips head screw	HW19003
16	Screw, 6-32 x 3/8 in. btn hd skt	HW09075
17	Lock washer, #6 int-t	HW67007
18	Flat washer, #6	HW66006
19	Cable clamp, 7/16 ID	4109065

* These parts are listed for reference only.
**Can only be used with NM6000 system software version ≥ 2.06.
If system is at earlier revision, kit 2.06 upgrade (P/N 4117240) is required.
If software version can not be determined, check part number of GAP: update is required if GAP part number is ≤ 4112970-005.


MIN FLOW CUTOFF SOLENOID
16
J10
VPO ASM
J4
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GAS POD
INTEGRATED PATIENT MONITORING MODULE
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J2
J2
J3
18
J5
J4
VITALBUS HUB ASM
J10, J13
J1
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J9
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VENTILATOR
PWR, HEATER
SOL
NETW
PROCESSOR
AUDIO OUT
EXT KBD CONN
KBD
PWR
SYS I/O
12
VID
TOUCH
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FAN (VITALBUS)
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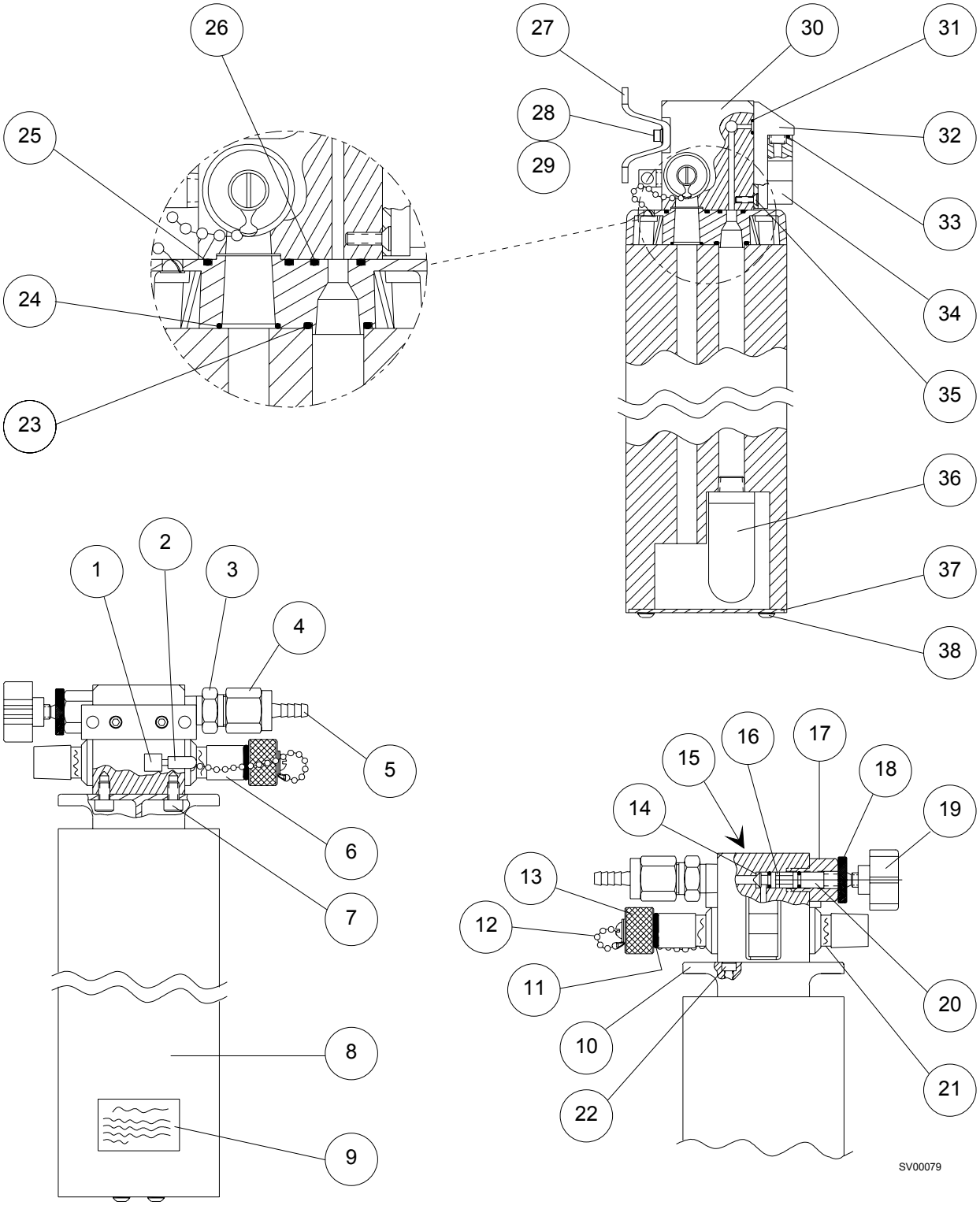
FLAT PANEL
CRT
FAN
6
TABLE LAMP & SCR ASM
J2
5
OVERRIDE LED
7
INTERFACE ASSEMBLY
FLOWMETER LIGHTS
J3
1
2
3
J1
O2 LOW PRESS SWITCH
17
DIVAN OVERRIDE
4
ON / STANDBY
J6
J1
J2
J3
J7
POWER SUPPLIES
CB
CB
CB
J5
21
MAINS
CONVENIENCE OUTLET
BATTERY
numbers shown in bold are keyed to item numbers in parts list

ITEM	DESCRIPTION	PART NUMBER

Internal cables and wire harness assemblies not listed elsewhere

1	Power supply J1 to Processor power	4114499
2	Power supply J2 to Divan ventilator and heater	4114500
3	*Power supply J3 to Vitalbus hub J9	4114501
4	Power supply J6 to Interface assembly J1 Divan override sw ON/STBY sw	4114506
5	Power supply J7 to Processor system I/O speaker O2 press sw connector Vitalbus Hub J10 and J13	4114502
6	Interface assembly J2 to Monitor power Monitor fan Ventilator solenoid Table lamp	4114795
7	Interface assembly J3 to flowmeter lights vent override LED	4114796
8	Video cable asm, processor to CRT (not used with flat panel)	4113390-001
9	Touchscreen cable asm, processor to crt (not used with flat panel)	4113288-001
10	Processor Power to fan (Vitalbus)	4114707
11	Processor Network to Vitalbus Hub J1	4113989-001
12	Processor Keyboard to external keyboard connector	4113990
13	Divan ventilator to VPO assembly J4	4114496
14	Vitalbus Hub J2 to VPO assembly J2	4113065-003
15	Vitalbus Hub J3 to Gas analyzer pod	4113065-002
16	VPO assembly J10 to min. flow cutoff solenoid	4114497
17	O2 low pressure alarm switch (joins to system I/O wire harness)	4114625
18	Vitalbus Hub J4 to Integrated Patient Monitoring Module	4113065-001
19	Vitalbus Hub J5 to Strip Chart Recorder Assembly	4113065
20	Cable Assembly, video & touch screen to processor (can be used with CRT or flat screen)	4115606
21	Cable Assembly, Battery to Power Supply J5	4114507

* Later design of this cable has a ferrite core noise suppression filter (P/N 4115155) installed at the power supply end of the cable.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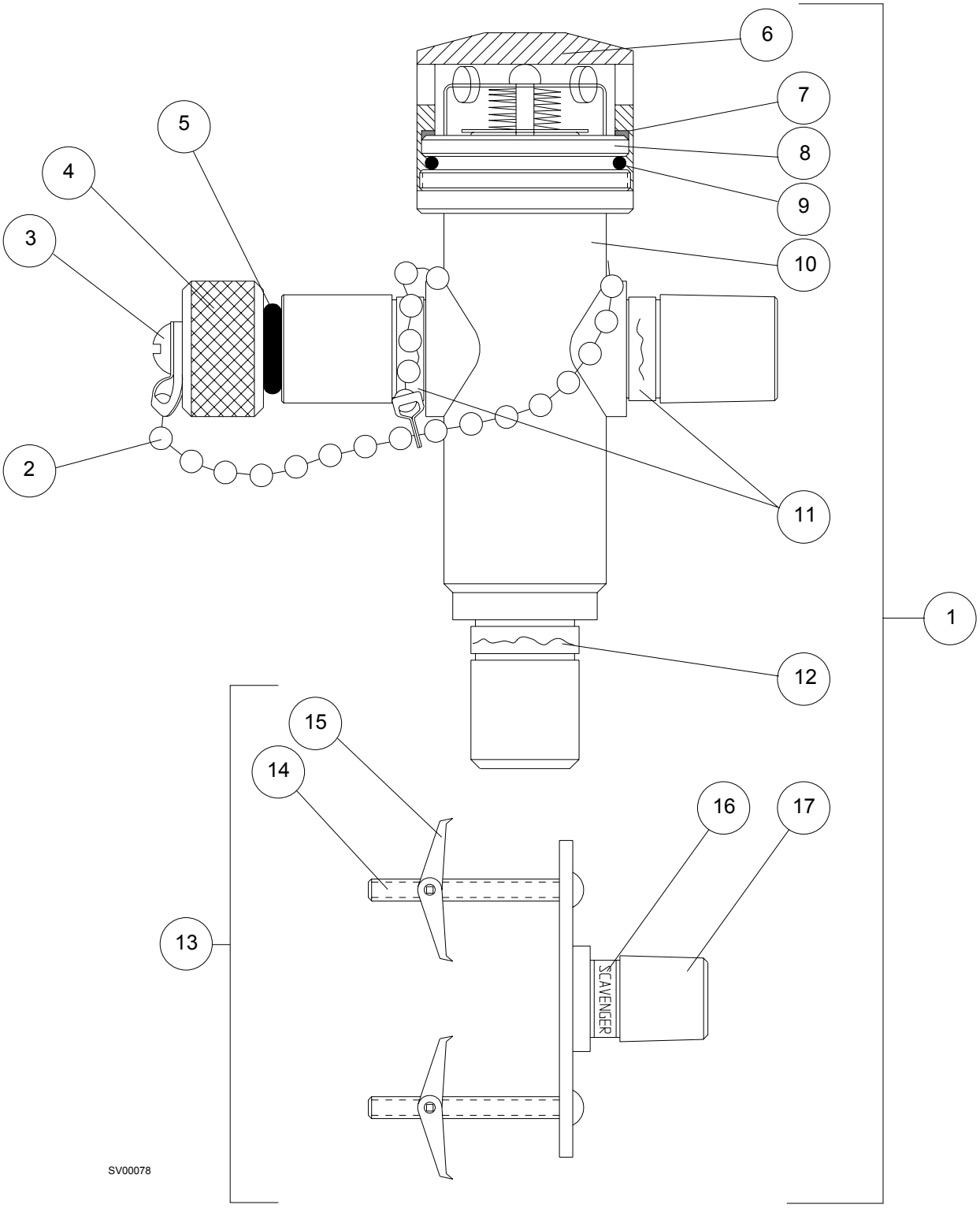
SV00079

ITEM	DESCRIPTION	PART NUMBER
	Open Reservoir Scavenger assembly	4107624-003
1	Elbow, 1/8 M x ¼ in. hose	4106881
2	Cap, vinyl	4110045
3	Body, DISS VAC x ¼ MPT	4103669
4	Nut, DISS VAC	4103122
5	Hose barb nipple	4103123
6	19 mm connector (2x)	4109315
7	Screw, ¼-20 x 3/8 in. skt hd (2x)	HW01033
8	Reservoir	4110982-001
9	Label, CAUTION	4104294-001
10	Reservoir top	4110979-001
11	O-ring, #112 (neoprene)	4102141
12	Chain, 8¼ in.	4112495-005
13	Plug	4102140
14	O-ring, #008 (neoprene)	4102022
15	Label, ACTIVATE HOSP VAC	4109305-001
16	Retaining ring	4110997
17	Nut, valve stem retainer	4109316
18	Lock nut, 3/8-24	4112137
19	Wing nut	4105699
20	Spindle	4112138
21	Label, SCAVENGER HOSE (2x)	4104806
22	Screw, 10-32 x ¾ in. skt hd (4x)	HW01028
23	O-ring, #019 (neoprene)	4106458
24	O-ring, #015 (neoprene)	4104602
25	O-ring, #019 (neoprene)	4106458
26	O-ring, #013 (neoprene)	4102234
27	Bracket	4114204
28	Screw, 8-32 x ½ in. skt hd (2x)	HW01014
29	Lock washer, #8 int-t (2x)	HW67000
30	Block	4111002-001
31	O-ring, #008 (neoprene)	4102022
32	Flowmeter housing	4110980
33	O-ring, #012 (neoprene)	1101523
34	Flowmeter	4112289
35	Screw, 6-32 x 3/8 in. flat hd (2x)	HW05006
36	Silencer	4110999
37	Reservoir cap	4111000
38	Screw, 10-32 x 3/8 in. btn hd (4x)	HW09005
	Upper mounting screw hardware: Screw, 10-32 x ½ in. skt hd	HW01025
	Lock washer, #10 split	HW65003
	Flat washer, #10	HW66003
	Lower mounting screw pre-assembly: Screw, 10-32 x ½ in. skt hd	HW01025
	Flat washer, #10	HW66003
	Spacer	4110791-037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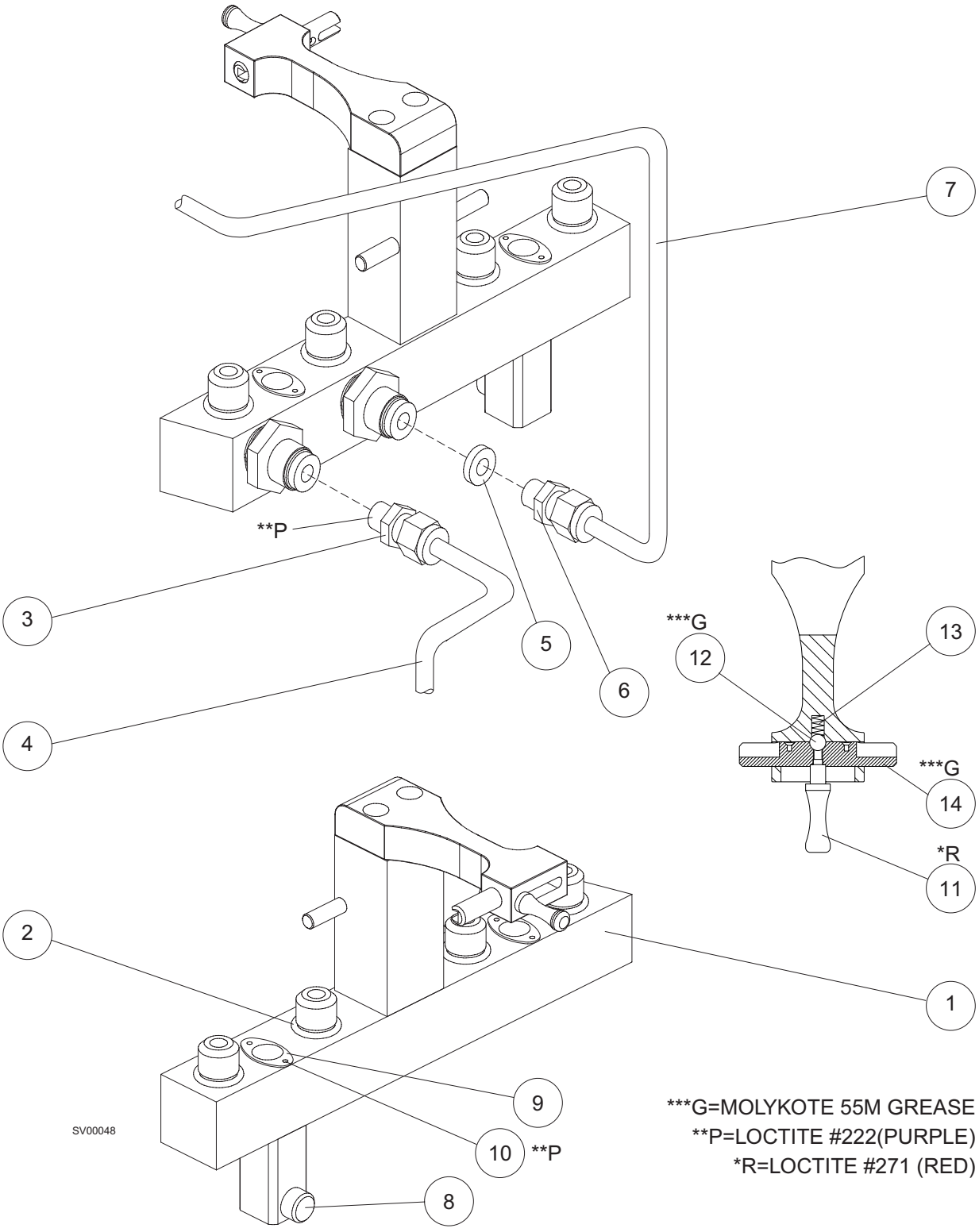
SCAVENGER
SV00078

ITEM	DESCRIPTION	PART NUMBER
1	Scavenger, A/C	4106161
2	Chain assembly, 8¼ in.	4112495-006
3	Screw, 10-32 x ½ in. rd hd	HW06007
4	Plug	4102140
5	O-ring, #112 (neoprene)	4102141
6	Dust cover	1101527
7	Spacer	4110792-007
8	Valve 'A' 5 cm H_2O	2207032
9	O-ring, #027 (neoprene)	4101871
10	Body, solder assembly	4102105
11	Label, SCAVENGER EXHAUST (2x)	4104806
12	Label, EXHAUST	4106878
	Mounting hardware for scavenger:	
	Screw, 10-32 x ½ in. cap skt hd (2x)	HW01025
	Lock washer, #10 split (2x)	HW65003
	Flat washer, #10 (2x)	HW66003
	Scavenger bracket	4114027
	Bracket clamp	1101301-001
	Screw, ¼-20 x 1 in. rd hd sltd (2x)	HW06010
13	Vent Grill Adapter (for 19 mm hose)	1101312
14	Screw, 10-24 x 3 in. rd hd (2x)	HW06012
15	Toggle nut (2x)	4101862
16	Label, SCAVENGER HOSE	4104806
17	Adapter assembly, 19 mm	1101609
	Hose barb adapter	4108114



***G=MOLYKOTE 55M GREASE
**P=LOCTITE #222(PURPLE)
*R=LOCTITE #271 (RED)

ITEM	DESCRIPTION	PART NUMBER
1	Vapor mounting and exclusion system (new)	4115019-002
	Service Exchange	SE4115019-002
2	O-rings, vaporizer mount (4x)	4115864
3	Fitting, straight, ¼ tube x M12	4109408-002
4	Tube, ¼ in. CU bent	4114918
5	Copper washer	4110792-093
6	Fitting, straight, ¼ tube x 1/8 ISO	4109408-001
7	Tube, ¼ in. CU bent	4114618
8	Vapor support	2600097
9	Quarter-turn socket (2x)	M28935
10	Socket mounting screws (4x)	1334514
11	Slider handle	M27143
12	Ball, detent	1270621
13	Spring, detent	A10594
14	Slider	M27142

not shown:

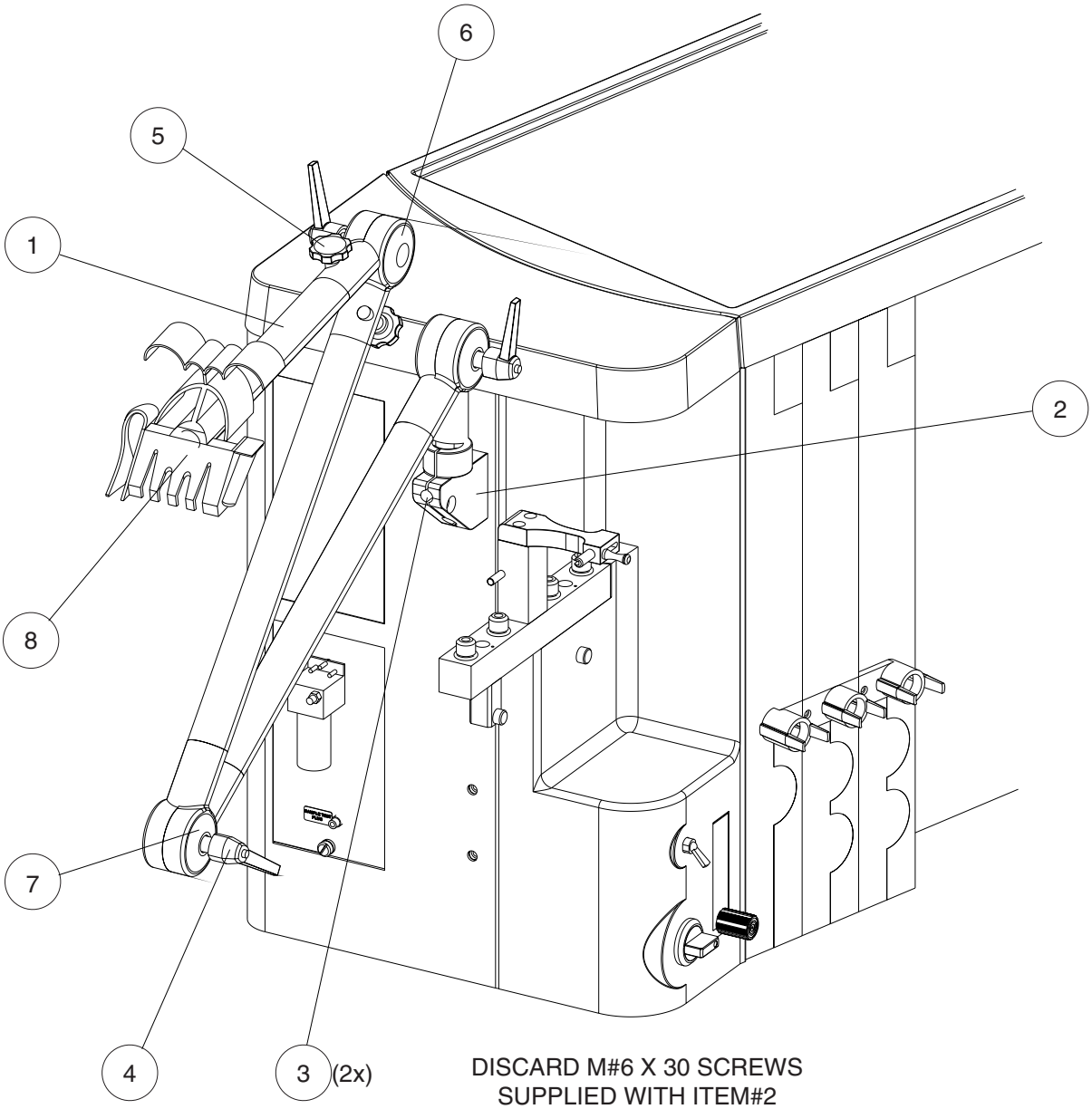
	O-rings, vaporizer storage position (2x)	4115864

Bumper depth adjustment spacers:

	Spacer, vapor exclusion, -0.020 in.	4117817
	Spacer, vapor exclusion, -0.040 in.	4117818
	Spacer, vapor exclusion, +0.020 in.	4117819
	Spacer, vapor exclusion, +0.040 in.	4117820

Miscellaneous items:

	Touch-up paint: Euro white	7900380
	Touch-up paint: Euro blue	7901261
	Spray paint: Euro white	S000094-002
	Spray paint: Euro blue	S000094-003
	Loctite purple 222	7910445
	Loctite red 271	4116897
	Molykote 55M grease	4115127
	Silicon Adhesive (Walker Elastosil)	1202527


6
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3 (2x)
DISCARD M#6 X 30 SCREWS
SUPPLIED WITH ITEM#2

ITEM	DESCRIPTION	PART NUMBER
	Boom Arm Option	4114926
1	Boom Arm, 4-segment	M34080
2	Mount Assembly, 4-segment boom arm	8601400
3	Screw, 1/4-20 x 1 1/4 in. cap skt hd	HW01039
4	Clamping Lever	8602177
5	Screw	8602178
6	Cap w/o hole	M34175
7	Cap w/ hole	M34174
8	Sensor holder	M34081

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Narkomed 6000 Service Manual

Rev. R summary of changes

Page	Description
i, ii, v	Revised TOC for new items and revised headings
2-6	New GAP Monitor service screen
2-11	New Service Config Notebook screen
2-15A	Revised note, new Software Options screen
2-17	Added Log Type keys to Figures 2-14 and 2-15
2-18 thru 2-18B	Revised text & layout, added text & figures for log filters
Added 2-18C, 2-18D	Continued revisions for log filters
4-60	Added text ref for loading WPU sw 3.01 in field
4-61	Added options labels call-outs to Figure 4-20
4-61B	Added Step 4.20.18.3: Templates and Sounds (Keylok)
4-62A	Deleted text at Step 4.20.28
4-62B	Added new Step 4.20.31 and Figure 4-20E1
4-62C	Added Templates and Sounds step to reconfiguration instrucs
4-68	Revised Step 4.23.6.4
4-71E	Added GAI firmware replacement instructions
4-71F	Added GAI firmware to GAP PCB illustration
4-71N	Revised Item 7 P/N in gas analyzer tubing table
4-77A, 4-77B	Revised text & illustration for SCR cable routing details
4-117	Added Loctite# designation to Step 4.36.28
4-120	Added Loctite# designation to Step 4.37.16
5-17A	Revised heading 5.7A
5-17D	Revised sub-heading: Video Position Adjustment
6-1	Revised PMC procedure text
6-3	Revised PMC general instructions text
6-7	Revised NM6000 PMC instructions
6-9A	Added absorber items to 3-year PM kit
7-9 thru 7-12	Deleted Section 7.6: gas analyzer modifications
8-1	Added boom arm to local TOC

Continued

8-6, 8-7 . . . . . Re-numbered call-outs, added IRIA P/Ns
8-7B. . . . . Revised Item 7 P/N in gas analyzer tubing table
8-10, 8-11 . . . . . Added Divan front panel components
8-31 . . . . . Removed ref only notations from Items 2 thru 6
8-36, 8-37 . . . . . Added battery cable to illustration & P/L
8-42, 8-43 . . . . . Added vapor excl sys slider & bumper depth adj spacers
Added 8-44, 8-45. . . . . Boom arm illustration & P/L

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DrägerService®

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